

THE LARGEST MECHANICAL CIRCULATION IN THE WORLD

MACHINERY

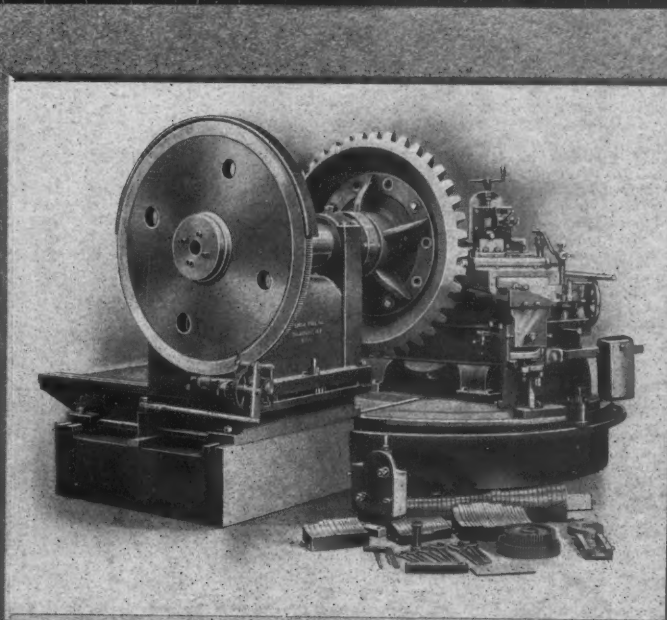
The Industrial Press New York

Regular Edition
Vol. 11. No. 12.

August, 1905.

\$2.00 a year.
20 cents a copy.

GEARS
GEAR PLANERS



77" Bevel and Spur
GEAR PLANNER

OUR EQUIPMENT PLANES DRIVING GEARS FOR
AUTOMOBILES TO DRIVING GEARS FOR STEEL MILLS

AGENTS: DUCK & HICKMAN, London; CHARLES CHURCHILL & CO.,
London; FENWICK FRERES, Paris; SCHUCHARDT & SCHUTTE, Berlin

GLEASON WORKS
ROCHESTER, N.Y.

For General Utility and All Around Convenience there's Nothing that Equals our Patent Combination Wrench.

It is adapted for any class of work that comes along—has all the necessary qualities for a Pipe Wrench, and at the same time all the requisite combinations of a regular Nut Wrench. Made in 8, 10, 12, 15 and 18 inch sizes. Strong and durable; all parts interchangeable.

Wrench Book sent on request.

Bemis & Call Hardware
and Tool Company,

Springfield, Mass., U. S. A.



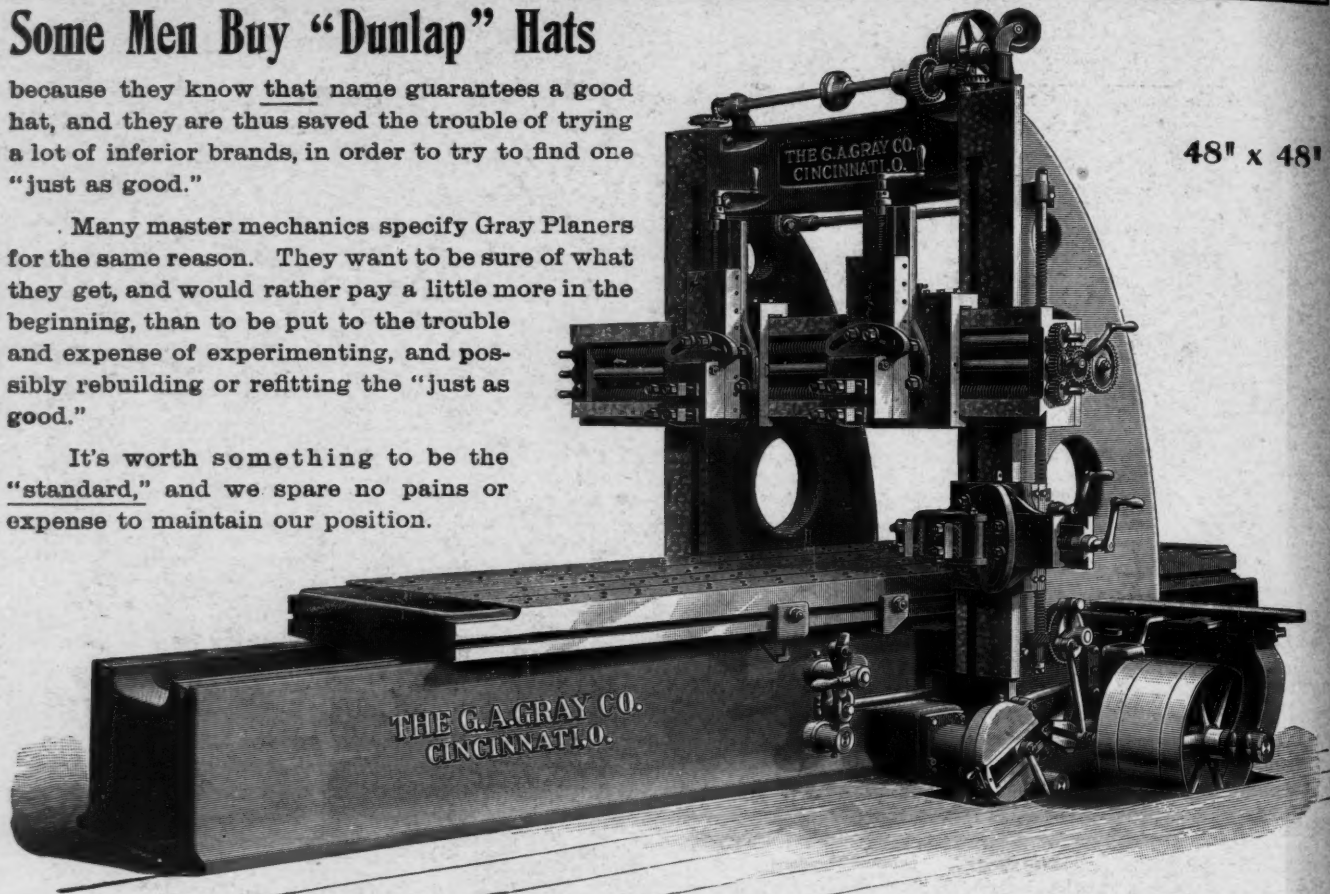
NO. 45, WITH LONG NUT.

Some Men Buy "Dunlap" Hats

because they know that name guarantees a good hat, and they are thus saved the trouble of trying a lot of inferior brands, in order to try to find one "just as good."

Many master mechanics specify Gray Planers for the same reason. They want to be sure of what they get, and would rather pay a little more in the beginning, than to be put to the trouble and expense of experimenting, and possibly rebuilding or refitting the "just as good."

It's worth something to be the "standard," and we spare no pains or expense to maintain our position.



The G. A. Gray Company, Cincinnati, Ohio.

THERMIT PROCESS

Dr. Goldschmidt Patent.

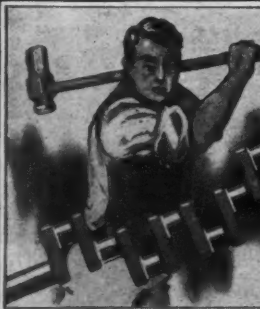
With this equipment you obtain anywhere in $\frac{1}{2}$ a minute:

1. Heat about 5400° F.
2. Pure Metals free from carbon, among them pure steel.

You use this combination to weld iron and steel of any section, rails, girders, pipes, etc. Titan Thermit prevents blow holes in castings.

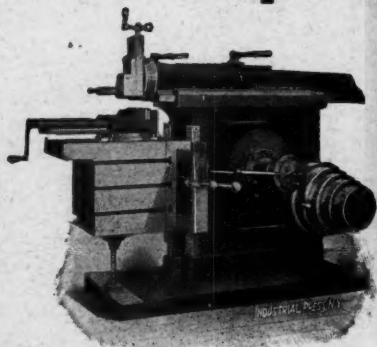
Goldschmidt Thermit Co., 43 Exchange Place, New York





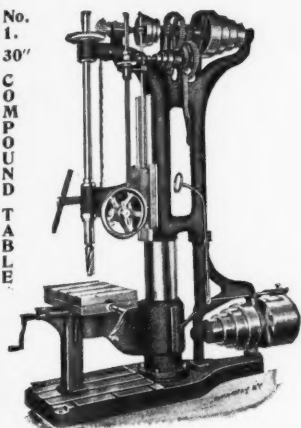
HIT HARD
you can't break it.
WE KNOW HOW TO MAKE THEM
TOUGH.
DROP
FORGINGS
Wyman & Gordon
WORCESTER, MASS. CLEVELAND, OHIO.

High Grade Shapers



Crank Shapers, 14", 16", 20", and 25" stroke.
Triple Geared Shapers, 24", 28" and 32" stroke.

The
John Steptoe Shaper Co.
Cincinnati, Ohio

No. 1.
30"
COMPOUND
TABLE

Snyder Celebrated Upright Drills

MESSRS. J. E. SNYDER & SON,
Worcester, Mass.

MILWAUKEE, WIS., May 9, 1905.

GENTLEMEN:—It gives us pleasure to report, in reply to your letter of the 4th inst., that the 36" drill that we purchased of you in January of this year is giving us most excellent satisfaction. The long travel to the spindle without resetting the head is a feature that makes the machine particularly advantageous for boring bars without, in any way, decreasing its efficiency for handling ordinary twist drills. We believe that the design of your machine and the quality of your workmanship merit and assure your continued success.

Very truly yours,

KEARNEY & TRECKER.

J. E. SNYDER & SON, Worcester, Mass.

We build nothing but Upright Drills.

Sizes 20 in., 21 in., 25 in., 28 in., 30 in. and 36 in.

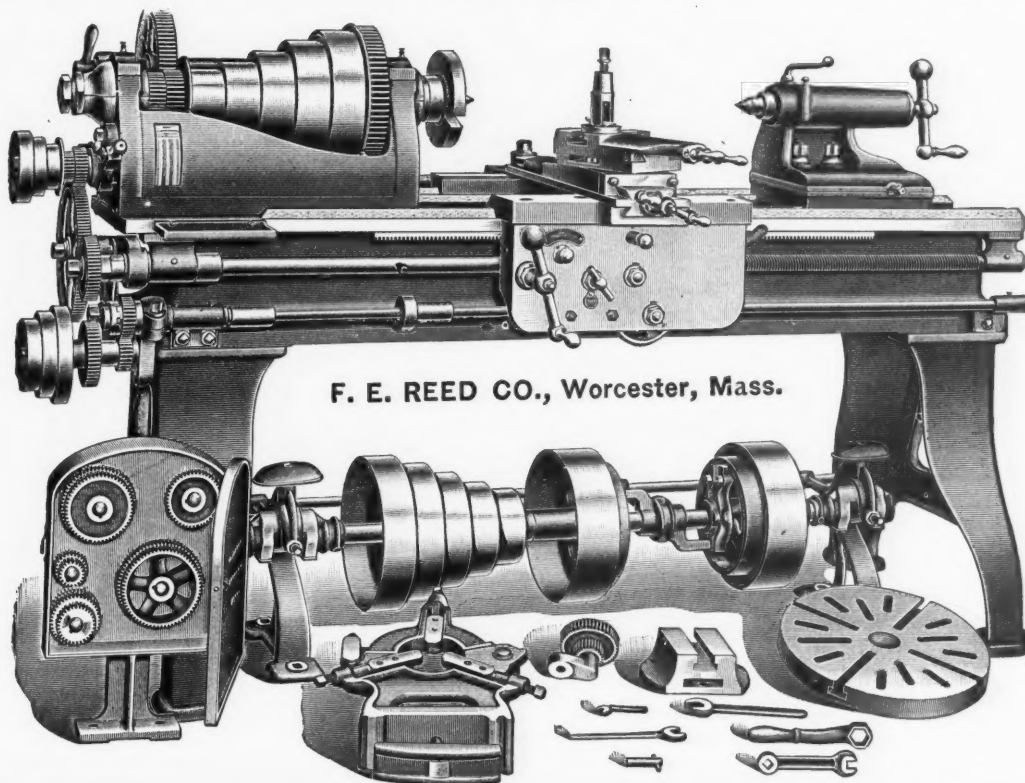


No. 2.
28"
MOTOR
DRIVE

Accurate fits by hand scraping.
Practically perfect proportions.
The "little things" about it
looked after with the utmost care.

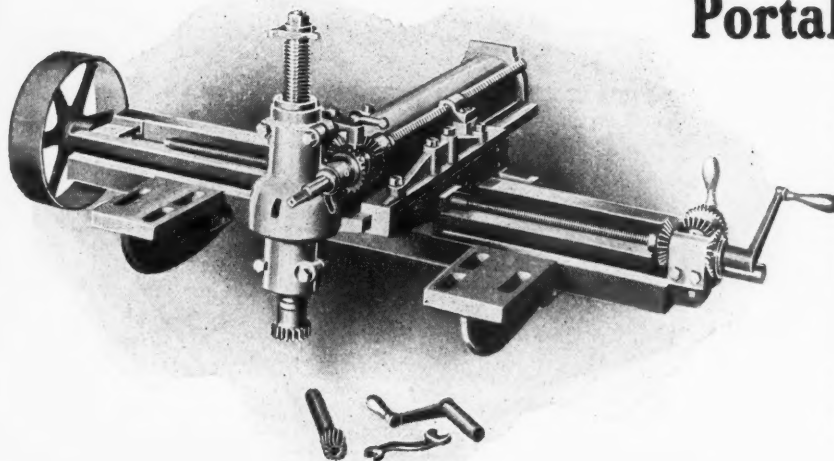
16"
GOLD
MEDAL
LATHE

The mechanical woods are full of
Reed Lathes—
WHY?



F. E. REED CO., Worcester, Mass.

Portable Milling Machine



Designed especially for facing steam engine valve seats in solid steam chests, but adapted for various kinds of work where it is easier to take the machine to the work than the work to the tool. Rapid and accurate in operation; can be used in any position; strongly geared and has power feed in both directions.

Our Catalogue of Portable Tools will interest you.

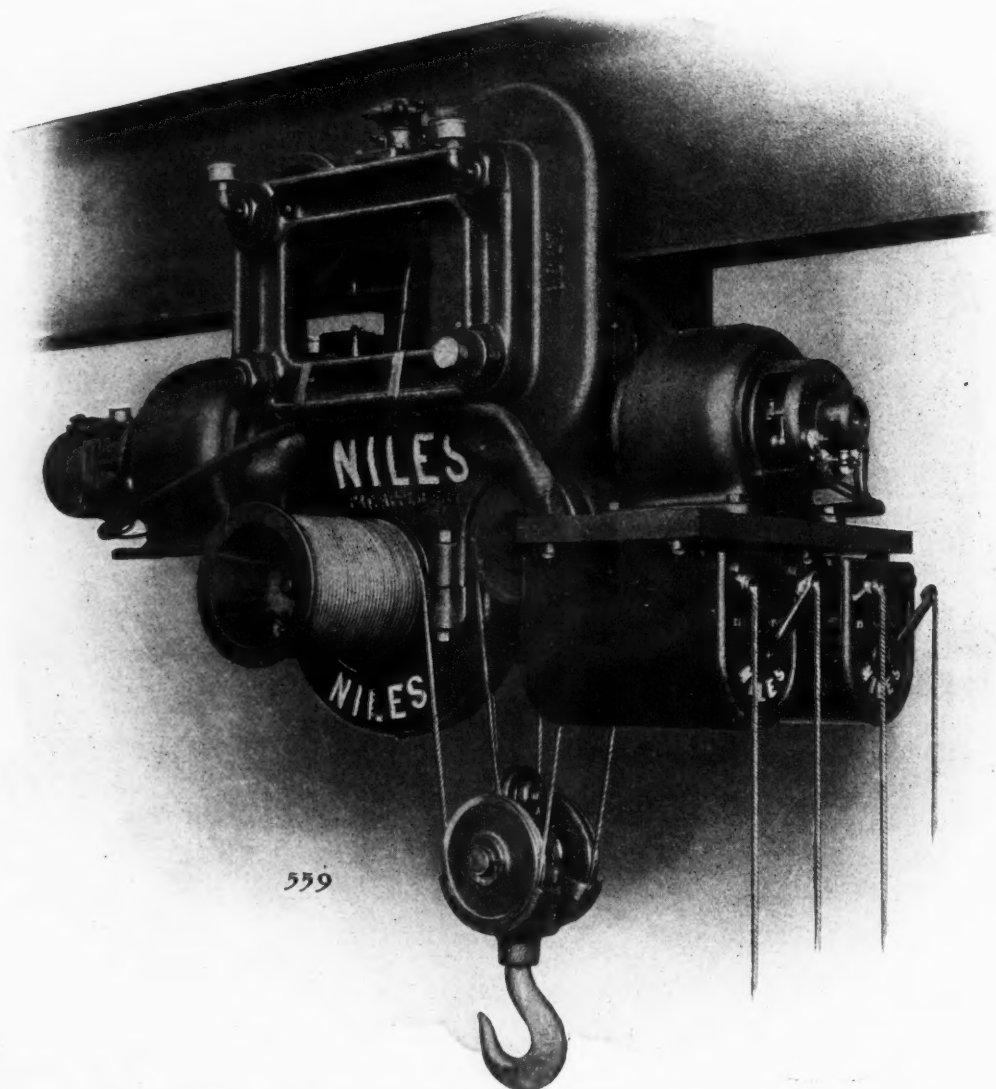
H. B. UNDERWOOD & CO.

DANIEL W. PEDRICK
MORRIS G. CONDON
ALBERT D. PEDRICK

1025 Hamilton Street
PHILADELPHIA, PA.

(L. B. FLANDERS MACHINE WORKS)

THE NEW NILES ELECTRIC TRAVELING HOIST



Several sizes of Niles Hoists are built with capacities of from $\frac{3}{4}$ to 6 tons. Power transmitted directly from armature shaft to drum shaft through one train of worm and worm wheel gears. Of compact design and self-contained in one heavy cast-iron frame to which the motors are attached end on. All mechanism enclosed in oil and dust proof casings and absolutely noiseless in operation. Powerful electric brake attached to the hoist motor. Will run on straight and curved tracks, may be provided with separate motor for traversing, hand traverse or traversing mechanism omitted and trolley moved along the track by pushing on the load.

Niles Electric Traveling Cranes

Standard Box Girder
Standard Plate Girder
Lattice Girder

Movable Jib
Walking Jib
Traveling Wall

Fixed Gantry
Traveling Gantry
Pillar, Etc.

NILES-BEMENT-POND CO.

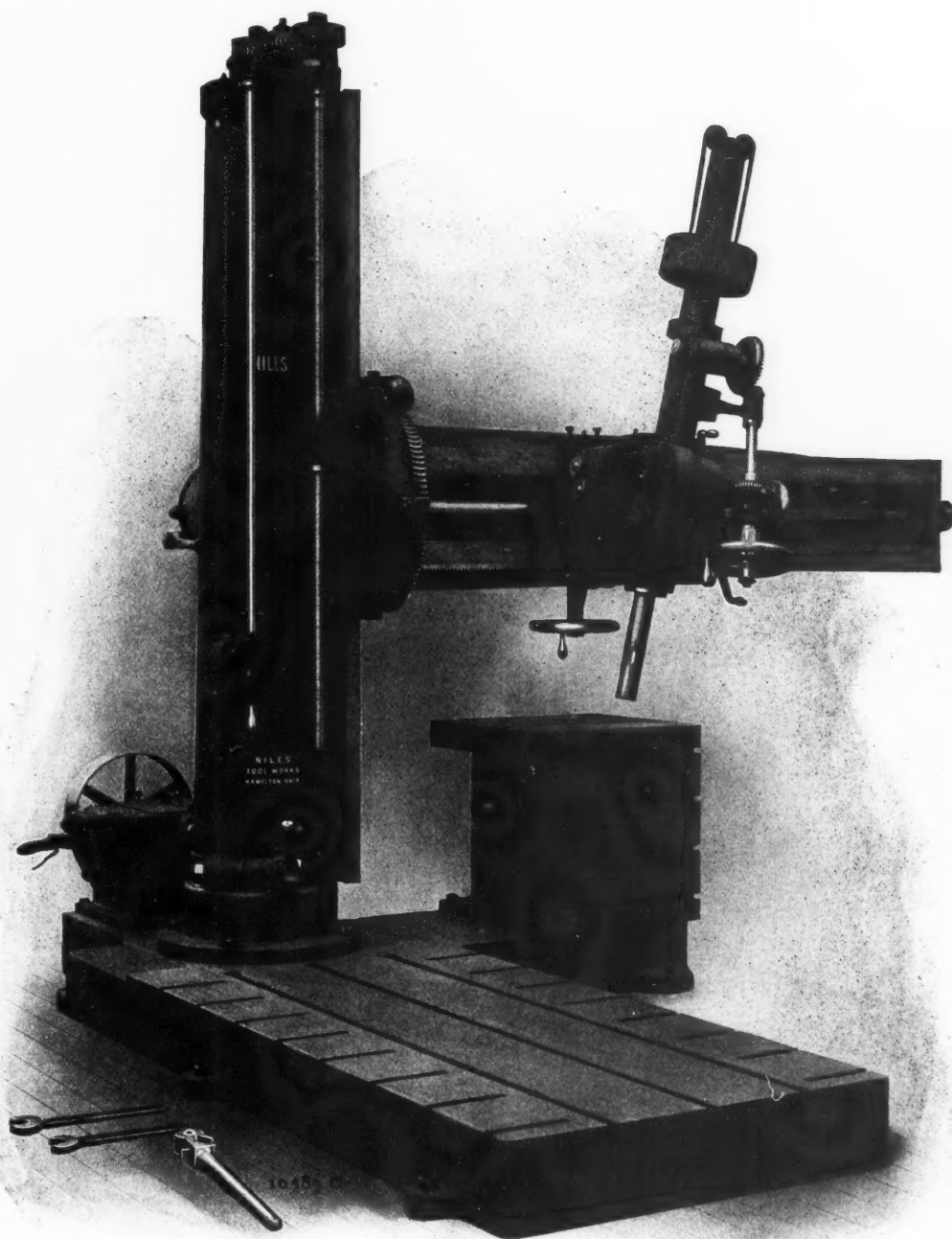
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Philadelphia, 21st and Callowhill Sts. Boston, 144 Pearl St. Chicago, Western Union Bldg. St. Louis, 516 North Third St. London, 23-25 Victoria St.

METAL WORKING MACHINERY OF EVERY DESCRIPTION

HYDRAULIC MACHINERY

STEAM HAMMERS



New Niles 6-foot Universal Radial Drilling Machine, for High Speed Drills

Reversing gears for tapping; single pulley drive; convenient levers for changing speeds and feeds while running; friction back-gears.

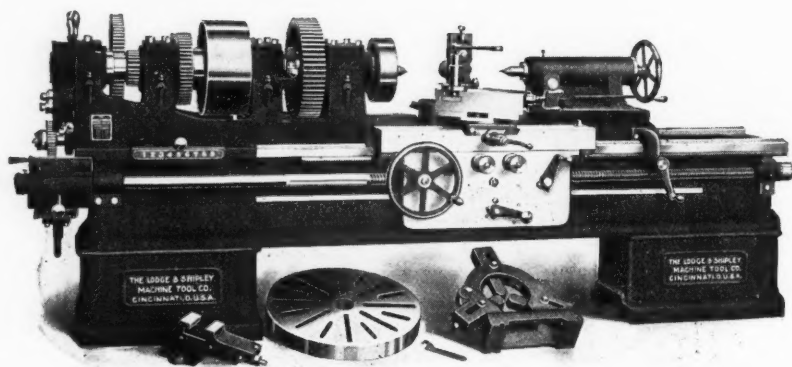
We build Radial Drills in three styles, both plain and universal, in ten sizes, with arms from 4 to 10 feet radius.

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Trinity Building, 111 Broadway, New York

Philadelphia, 21st and Callowhill Sts. Boston, 144 Pearl St. Chicago, Western Union Bldg. St. Louis, 516 North Third St. London, 23-25 Victoria St., S. W

More Lathe Work with Fewer Lathes



WHY

**BUY AN ENGINE LATHE AND
A HIGH SPEED LATHE
WHEN**

THE PATENT HEAD LATHE

**Satisfies both conditions, and ALL other
conditions in lathe practice?**

This lathe has perfect lubrication, QUICK change gear system, WIDE belt and SEPARATE bearings for receiving belt pull. Let us send you a table showing its power as compared with a standard cone pulley lathe.

THE LODGE & SHIPLEY MACHINE TOOL CO.
CINCINNATI, OHIO, U. S. A.

CANADIAN AGENTS—Williams & Wilson, Montreal. H. W. Petrie, Toronto. EUROPEAN AGENTS—C. W. Burton, Griffiths & Co., London. V. Lowener, Copenhagen. R. S. Stokvis & Zonen, Rotterdam. Adler & Eisenschitz, Milan. Schuchardt & Schutte, Berlin, Germany. Alfred H. Schutte, Cologne, Germany.

BETTS MACHINE COMPANY

WILMINGTON, DEL., U. S. A.

Makers
of...

Heavy Machine Tools

For
High Speed Steel

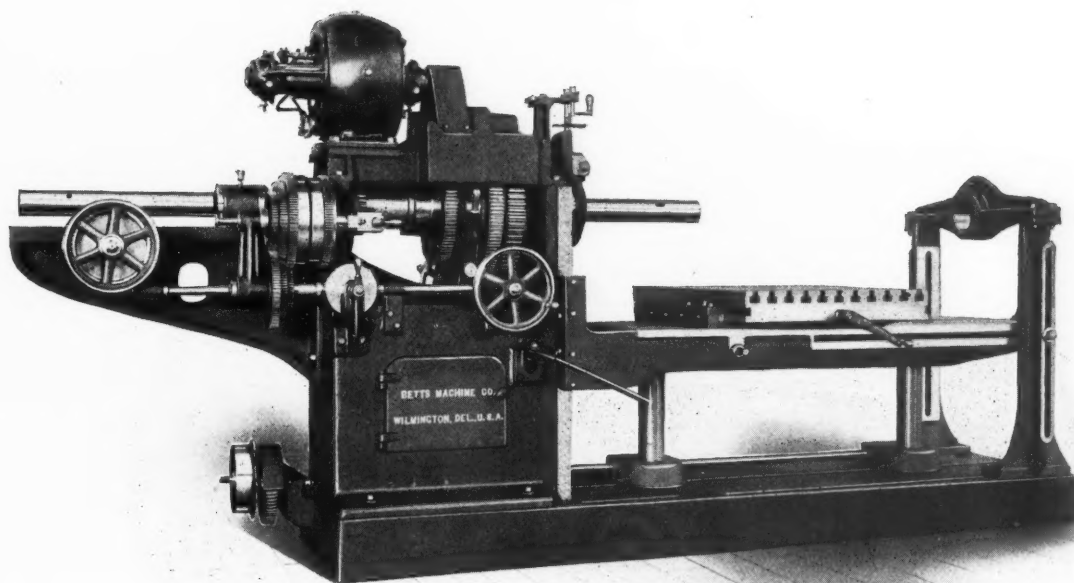


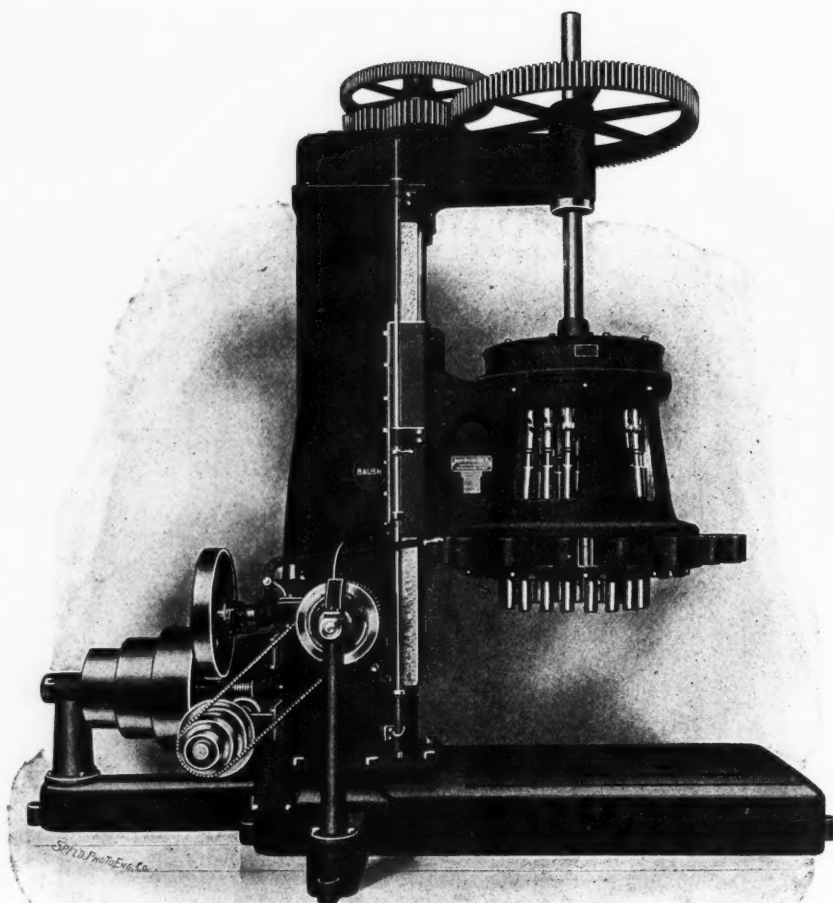
ILLUSTRATION SHOWS THE ELECTRIC-DRIVEN NO. 2 HORIZONTAL BORING AND DRILLING MACHINE, AS ARRANGED FOR GENERAL ELECTRIC CO., WEST LYNN, MASS., WITH NORTHERN ELECTRICAL MFG. CO., MOTOR OUTFIT

This machine has table 8 feet long, and spindle diameter of 4 in. The cross table is 36 in. by 48 in. The extreme distance from centre of spindle to top of long table is $38\frac{1}{4}$ in., thus allowing a swing of $76\frac{1}{2}$ in. There are six changes of automatic feed, three for drilling, three for boring.

HORIZONTAL BORING AND DRILLING MACHINES

VERTICAL BORING AND TURNING MILLS

PLANING MACHINES, SLOTTING MACHINES, ETC., ETC.



It is the Province of Baush Multiple Drilling Machines

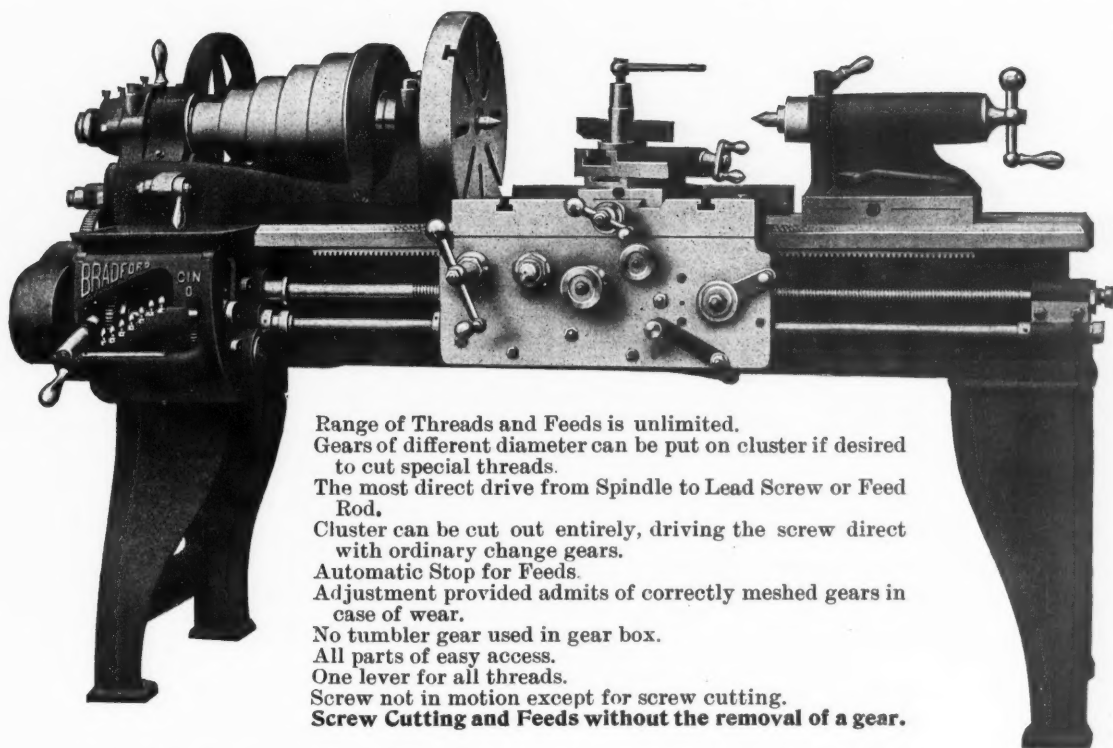
to save time and labor in drilling operations. Twenty $\frac{1}{2}$ -inch holes can be drilled to a depth of $3\frac{1}{4}$ inches in **one minute** and with one setting of the work. These drills are particularly adapted for high speed steels, are adjustable to any layout, either in a circle or square, and are built in both Vertical and Horizontal styles, 4 to 20 spindles; Horizontal type with one or two heads.

Used by the largest shops in the country, especially by manufacturers of motors, engines, gas engines, valves, pipes, etc. Catalogue on request.

Baush Machine Tool Company
SPRINGFIELD, MASS., U. S. A.

Agents, Manning, Maxwell & Moore, Inc., New York, Chicago, Cleveland, Philadelphia, Pittsburg, Boston, St. Louis.

Bradford 16" Quick Change Gear Lathe

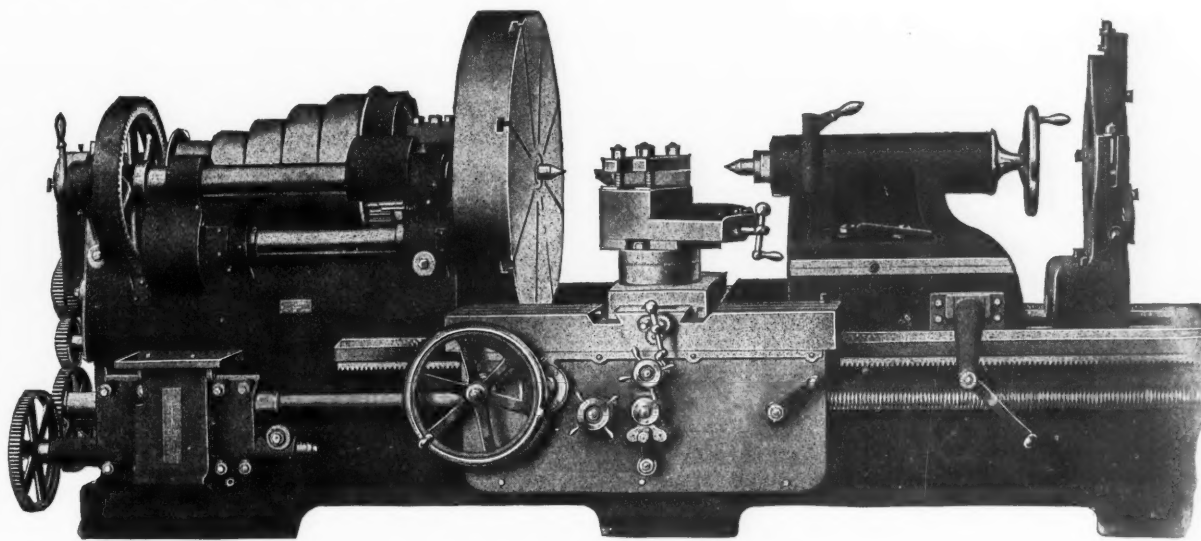


Range of Threads and Feeds is unlimited.
Gears of different diameter can be put on cluster if desired to cut special threads.
The most direct drive from Spindle to Lead Screw or Feed Rod.
Cluster can be cut out entirely, driving the screw direct with ordinary change gears.
Automatic Stop for Feeds.
Adjustment provided admits of correctly meshed gears in case of wear.
No tumbler gear used in gear box.
All parts of easy access.
One lever for all threads.
Screw not in motion except for screw cutting.
Screw Cutting and Feeds without the removal of a gear.

Cuts screws per inch 3, $3\frac{1}{4}$, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5, $5\frac{1}{2}$, 6, 7, 8, 9, 10, 11, $11\frac{1}{2}$, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 26, 27, 28, 30, 32, 33, 36, 40, 44, 46

Feeds $4\frac{1}{2}$ times threads.

Extra gear is supplied for 19 thread, or for any thread or threads not given on index. This extra gear can be made a part of the cluster or used independently.



BRADFORD 42-INCH LATHE

A study of the illustration tells what may be expected of this lathe. Powerfully built and strongly geared, with all conveniences for quick manipulation, makes such a machine invaluable to the shop for work of 42 inches diameter and under. Actual swing over Bed $43\frac{1}{2}$ inches; over Carriage Bridge $32\frac{1}{2}$ inches; 3-inch Hollow Spindle; Power Angular Feed to Compound Rest; built Back or Triple Geared; cuts screws from $\frac{1}{2}$ to 24 per inch, and Spirals one turn in 16 inches or coarser. Beds made in any length; 12 ft. takes 4 ft. between centers. Write for Catalogue.

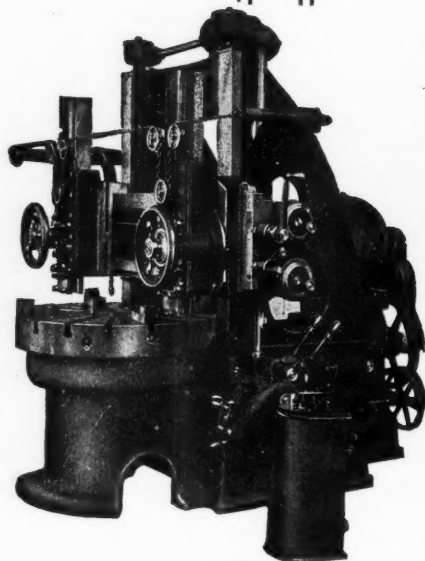
LATHES, 14 to 42-inch Swing.

THE BRADFORD MACHINE TOOL CO., CINCINNATI, OHIO, U. S. A.

Vandyck Churchill Company, New York and Philadelphia, Eastern Agents. Pacific Tool and Supply Co., San Francisco, Cal., Agents for Pacific Coast. Foreign Agents: Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow, Newcastle-on-Tyne. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. F. W. Horne, Agent for Japan, China, and the Far East.

Gisholt Boring Mills

THE very latest and most modern line of Boring Mills yet placed on the market. Our Vertical Mills range from 34" up to 72", and are specially constructed to withstand the heaviest strains attending up-to-date machine-shop practice.

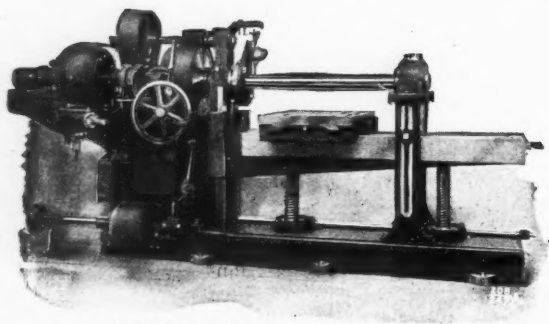


Distinctive features of Gisholt Mills lie in friction back geared headstock; convenient position of all operating levers; positive automatic stops for all feeds; feed dials that may be set to trip any feed in any direction at any predetermined point; self-calculating, requiring no computation on the part of the operator; micrometer index dials on all feed screws reading to .0010", thus materially reducing time-consuming scale and caliper work; single-pulley drive giving constant belt speed; easily adapted to motor drive without increasing the floor space; encasement of all gears; design massive, neat; wearing surfaces broad; machine self-contained.

Gisholt Machine Company

Madison, Wis., U. S. A.

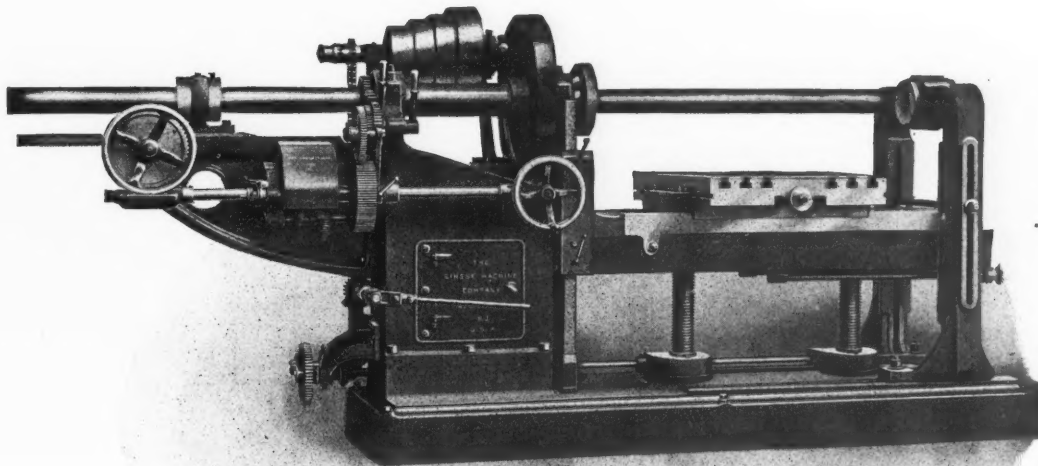
1316 Washington Ave.



FOREIGN AGENTS: Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. Schuchardt & Schutte, Vienna, St. Petersburg, Stockholm, Berlin. C. W. Burton, Griffiths & Co., England.

High Duty Boring Machine

FOR HIGH SPEED STEELS



The 4-inch Binsse Horizontal Boring and Drilling Machine is of new design and one of the most powerful boring machines on the market. It is triple geared with ample power for driving high speed steels and has driving speeds arranged in geometrical ratio. Among other advantages, the machine has variable speed power table lift, permitting table to be raised slowly or rapidly according to the weight of the casting to be bored. The yoke is set quickly and accurately by means of a hand power yoke movement. Bar feeds are nine in number from 1-200" to $\frac{1}{2}$ ". Boring bar, extra long, will feed 36" at one setting, while a bar feed of 48" or 60" can be furnished if desired.

Binsse Boring Machines are largely used in railroad shops; one railroad, known to be a particularly keen buyer of machine tools, has five of these tools in one shop. Write us for particulars.

THE BINSSE MACHINE COMPANY

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Marshall & Huschart Machinery Co., Chicago. Motch & Merryweather Machinery Co., Cleveland.
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R. & J. MORISON & BEARBY,
Carrington, Newcastle, N. S. W.
Engineers and Machinists,
Marine, Milling and Mill Machinery, and Engi-
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Agents for American Machine Tools.

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Dealers in American Machinery and Tools,
are open to enter into correspondence with first-
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9 to 15 Leonard St., London, E. C.
The Pioneers of American Tool Trade
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Established 1865. Large warehouses in Birming-
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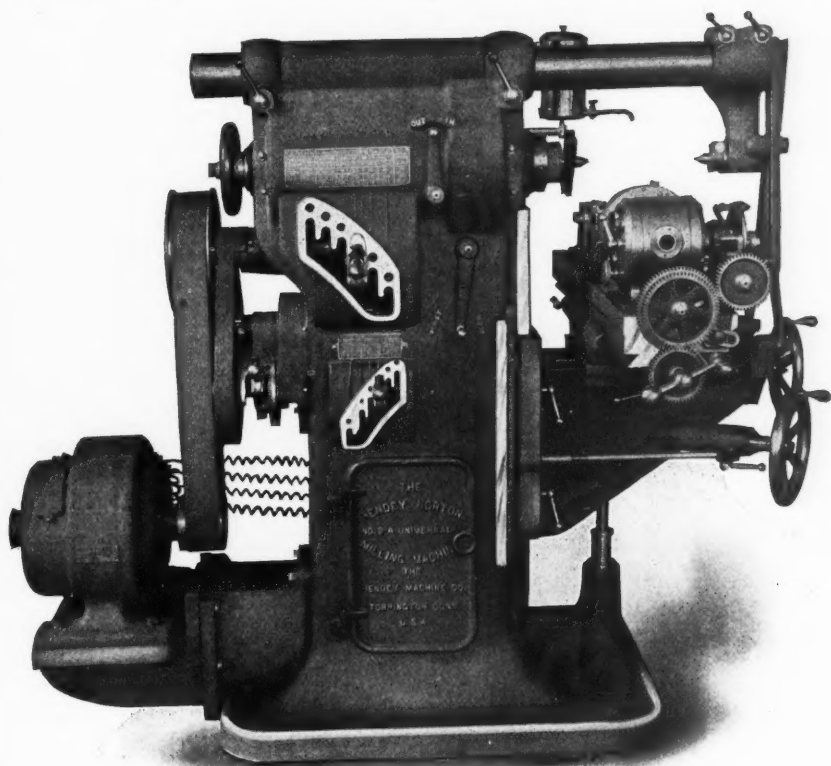
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The New Hendey-Norton Positive Geared Speed Milling Machine



A machine that has **18 progressive spindle speeds** from a constant speed driving shaft.

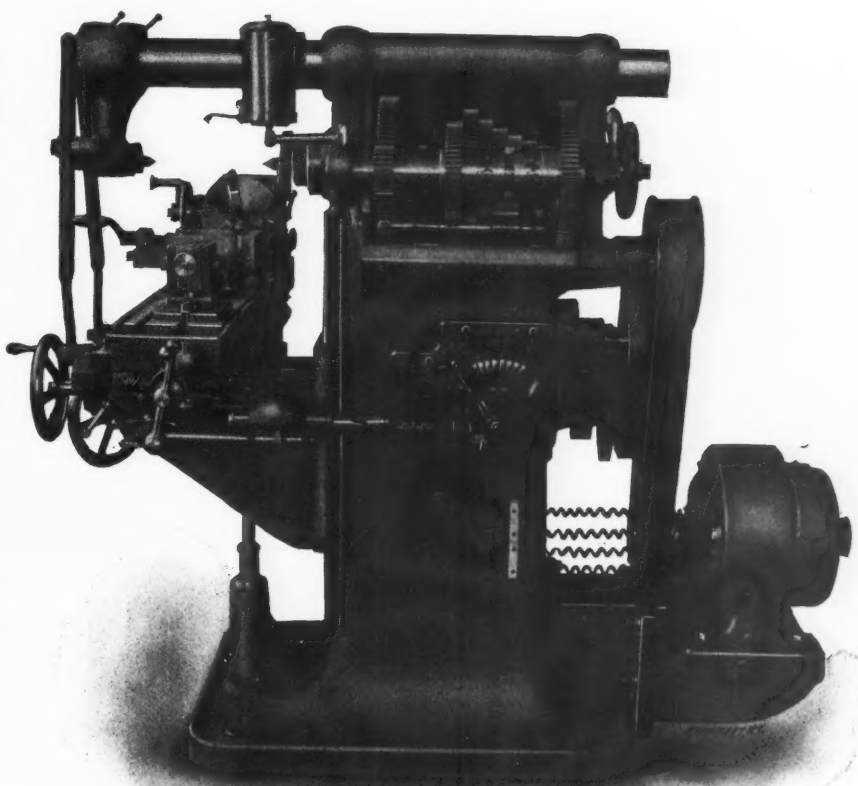
A machine that is **double back geared**, giving one direct and two back gear speeds with each setting in the cone of gears on spindle.

A machine that has **18 different changes of feeds** for each and every spindle speed.

A machine with **all feeds automatic**.

A machine that has all the good points of our regular millers.

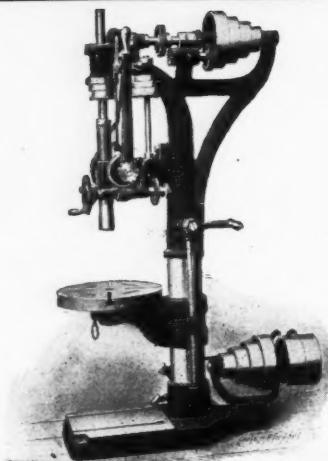
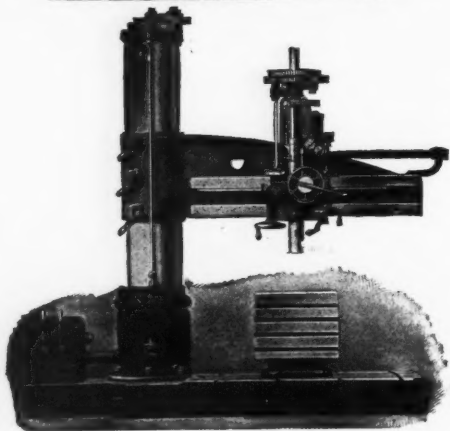
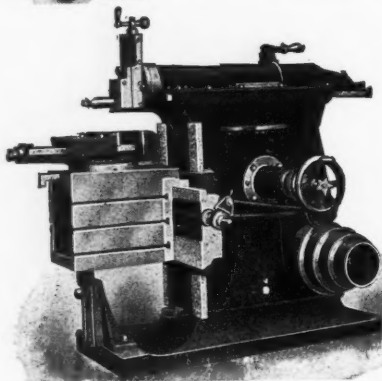
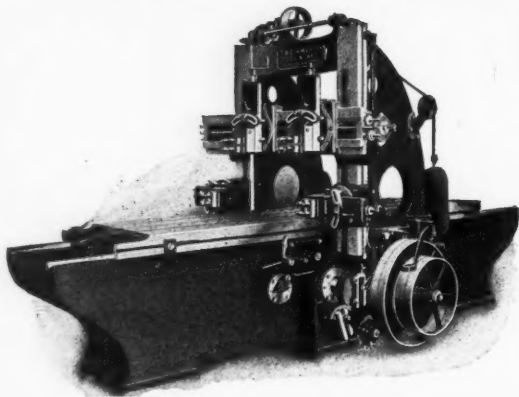
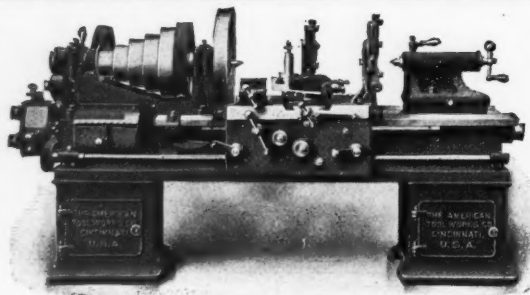
Made at present in sizes $1\frac{1}{2}$ -H Universal and No. 2 Plain and Universal.



*Send for new 64-page Milling
Machine Catalog.
Now ready.*

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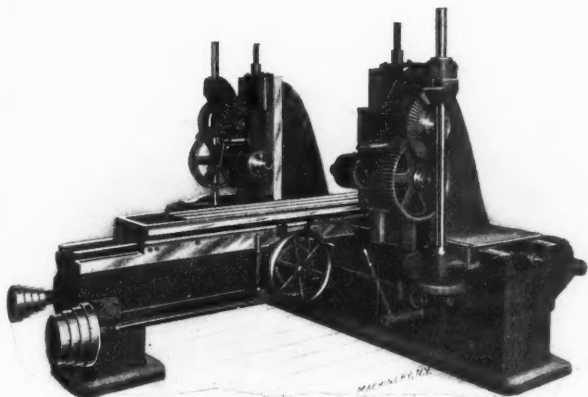
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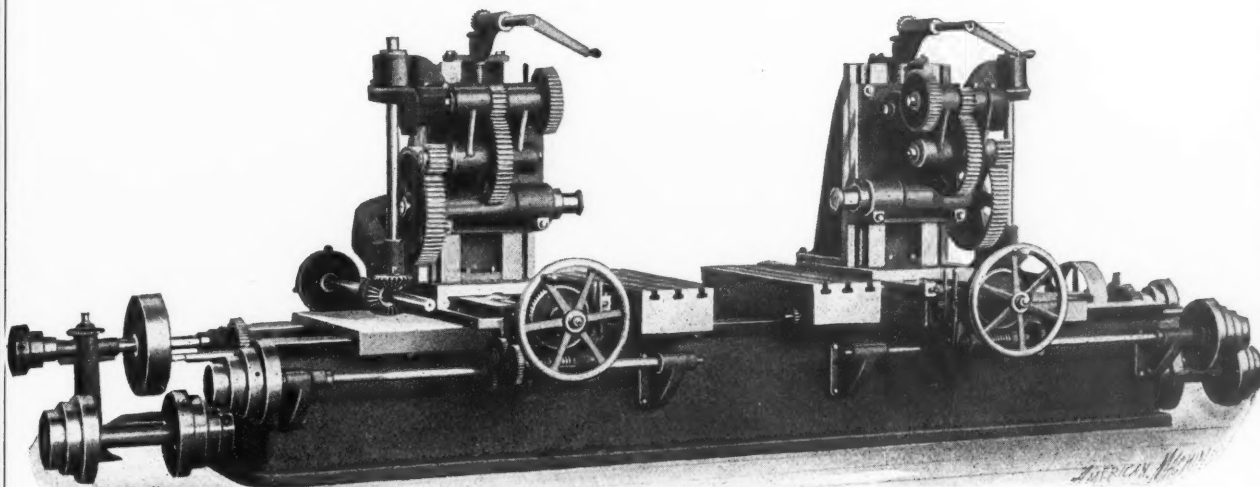
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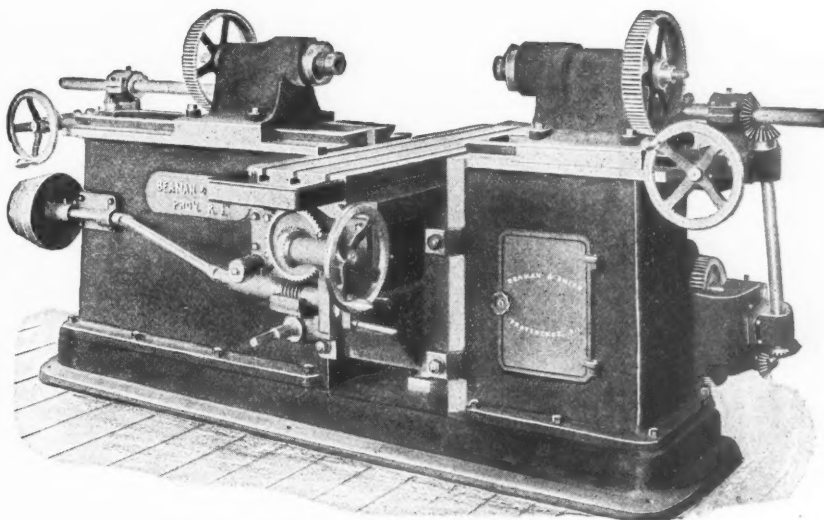
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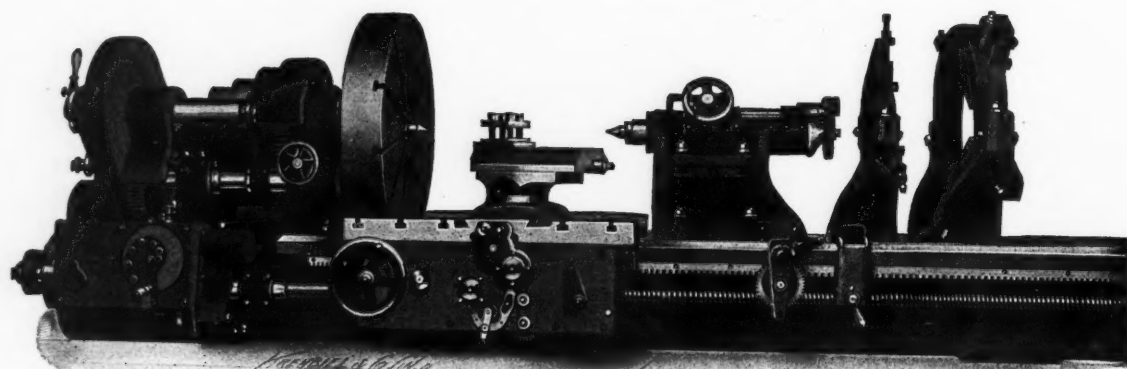
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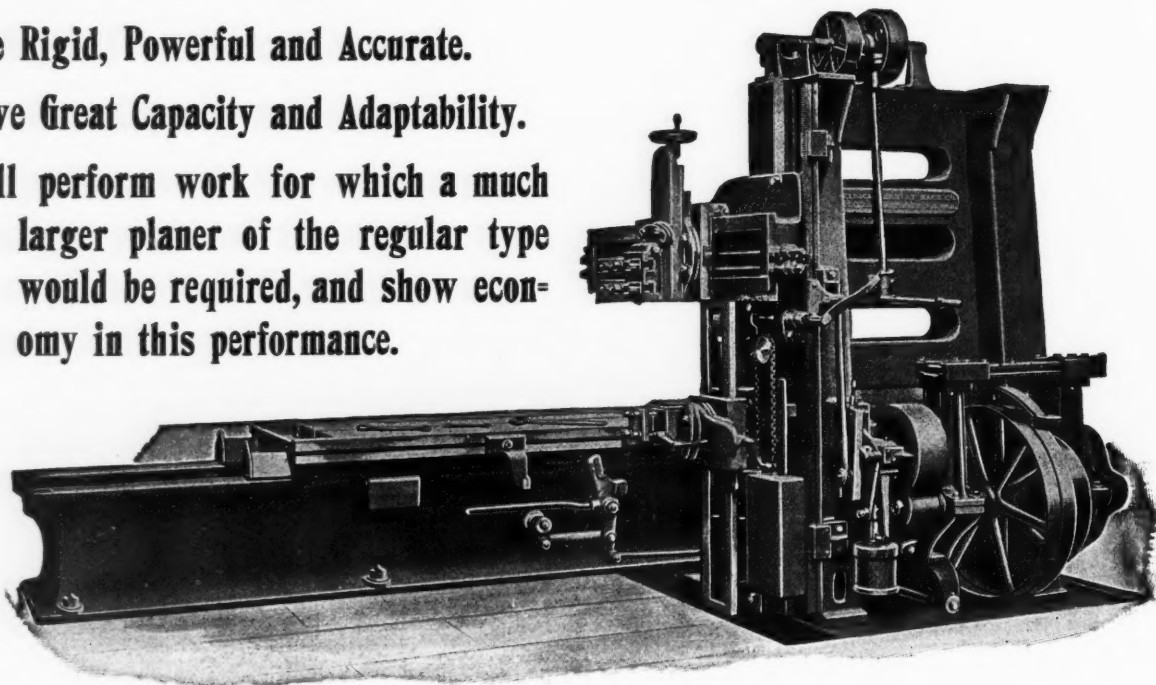
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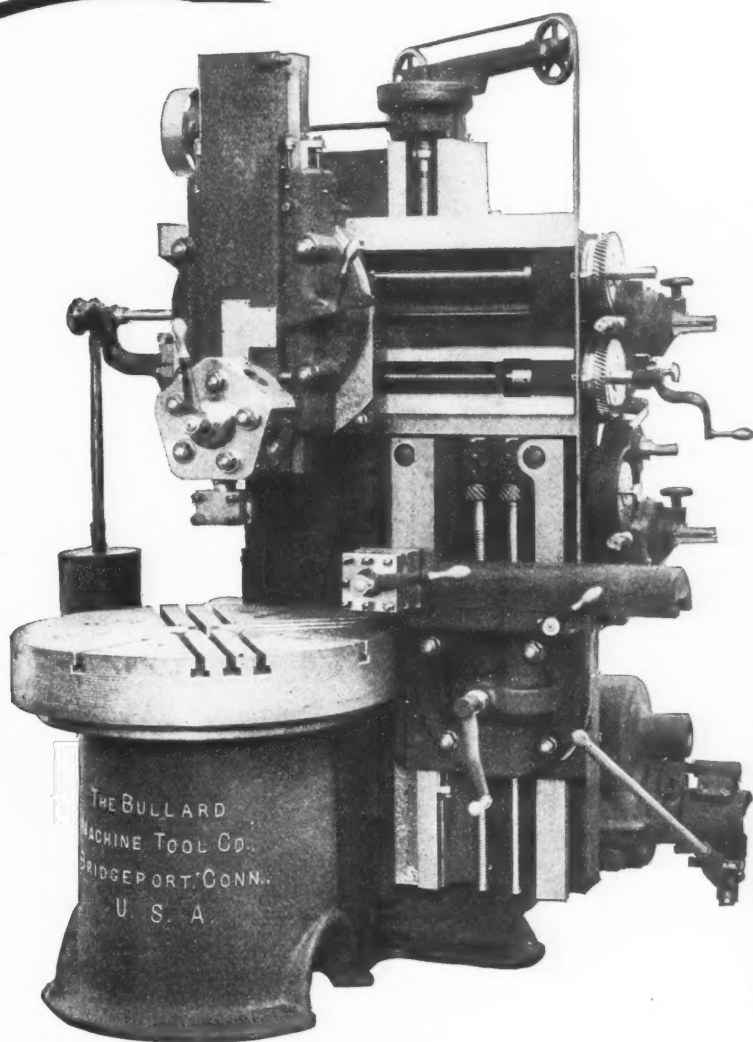
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Alphabetical Index of Advertisers.

- Abrasive Material Co. 98
 Acme Machinery Co. 27
 Adams Co. 96
 Affleck, Geo. E. 104
 Almond, T. R., Mfg. Co. 115
 American Ball Co. 115
 American Blower Co. 85
 American Gas Furnace Co. 98
 American Pulley Co. 112
 American Tool Works Co. 14
 Andrew, M. L., & Co. 97
 Arguto Oilless Bearing Co. 79
 Armstrong Bros. Tool Co. 47
 Armstrong Mfg. Co. 120
 Arthur Co. 108
 Athol Machine Co. 114
 Atlas Mch. Co. 105
 Auburn Ball Bearing Co. 101
 Audel, Theo., & Co. 106
- Baird, Henry Carey & Co. 106
 Baird Machinery Co. 104
 Baker Bros. 82
 Balkwill Pattern Wks. 100
 Ball Bearing Co. 116
 Bantam Anti-Friction Co. 108
 Bardons & Oliver 62
 Barnes, B. F., Co. 79
 Barnes, W. F. & J., Co. 56
 Barnett, G. & H., Co. Back cover
 Barr, H. G. 95
 Bath Grinder Co. 106
 Baush Mch. & Supply Co. Back cover
- Raush Mch. Tool Co. 8
 Bay State Stamping Co. 31
 Beaman & Smith Co. 15-117
 Beaudry & Co. 110
 Becker-Brainard Milling Mch. Co. 71
 Bemis & Call, H. & T., Co. Inside front cover
- Bertsch & Co. 119
 Besly, Chas. H., & Co. 59
 Betts Mch. Co. 7
 Bickford, H., & Co. Back cover
 Bickford Drill & Tool Co. 64
 Bignall & Keeler Mfg. Co. 81
 Bilgram, Hugo 108
 Billings & Spencer Co. 34
 Binsse Machine Co. 11
 Birdsboro Steel Fdry. & Mch. Co. 23
 Bissell, F., Co. 31-104
 Blanchard Mch. Co. 24
 Bliss, E. W., Co. 33
 Boston Gear Works 108
 Bowsher, N. P., Co. 107
 Bradford Mch. Tool Co. 9
 Bradley, C. C., & Son 110
 Bridgeport Safety Emery Wheel Co. 107
 Brown, H. B., Co. 121
 Brown, R. H., & Co. 116
 Brown-Cochran Co. 105
 Brown & Sharpe Mfg. Co. 35
 Browning Engineering Co. 99
 Builders' Iron Foundry. Back cover
- Bullard Mch. Tool Co. 19
 Bultman, F. H., & Co. 108
 Burke Mch. Co. 119
 Burnham, Royal E. 103
 Burr, J. T., & Sons. 89
 Butler, A. G. 101
 Butterfield & Co. 31
- Calder, Geo. H. 106
 Caldwell, H. W., & Son Co. 80
 Carborundum Co. 106
 Card, S. W., Mfg. Co. 115
 Carlyle Johnson Mch. Co. 112
 Carpenter, J. M., Tap & Die Co. Back cover
- Carr Bros. 100
 Carter & Hakes Mch. Co. 115
 Chambersburg Eng. Co. 111
 Chicago Flexible Shaft Co. 92
 Cincinnati Mch. Tool Co. 34
 Cincinnati Milling Mch. Co. 37
 Cincinnati Planer Co. 78
 Cincinnati Punch & Shear Co. 28
 Cincinnati Shaper Co. 66
 Clapp, E. D., Mfg. Co. 110
 Clark, Jas. Jr., & Co. Back cover
 Cleveland Auto. Mch. Co. 57
 Cleveland Twist Drill Co. Back cover
- Cling-Surface Co. 113
 Coates Clipper Mfg. Co. 95
 Coburn Trolley Track Mfg. Co. 61
 Cochran-Bly Co. 102
 Coes Wrench Co. 34-52
 Colburn Mch. Tool Co. 87
 Columbus Machine Co. 120
 Cook, Asa S., Co. 94
 Corrugated Grinding Wheel Co. 106
 Crane Co. 115-121
 Crocker-Wheeler Co. 50
 Cullman Wheel Co. 108
 Curtis & Curtis Co. 120
 Curtis & Co. Mfg. Co. 84
 Cushman Chuck Co. 115
 Cutler-Hammer Clutch Co. 51
- Desmond-Stephan Mfg. Co. 107
 Detrick & Harvey Mch. Co. 16
 Detroit Twist Drill Co. 28
 Diamond Chain & Mfg. Co. 24
 Diamond Mch. Co. Back cover
 Diamond Saw & Stamping Works 89
 Dickinson, Thos. L. 98
 Dlenelt & Eisenhardt 110
 Dietzen Co., Eugene. 102
 Dill, T. C., Mch. Co. 49
 Dixon, Jos., Crucible Co. 118
 Dreses Mch. Tool Co. 83
 Duff Mch. Co. 120
 Dunn & Turk 103
 Dwight Slate Mch. Co. 74
- Easton Polishing Supply Co. 107
 Eaton, Cole & Burnham Co. 26-29
 Earle Gear & Mch. Co. 109
 Eberhardt Bros. Mch. Co. 108
 Eck Dynamo & Motor Works 105
 Elec. Controller & Sup. Co. 50
 Electro-Dynamic Co. 49
 Elgin Tool Wks. 100
 Elmes, Chas. F., Eng'g Wks. 29
 Emmert Mfg. Co. 114
 Englehard, Chas. 30
 Erie Forge Co. 82
 Espen-Lucas Mch. Wks. 89
 Evans, G. F. 113
- Fay & Scott 87
 Fellows Gear Shaper Co. 93
 Flather & Co. 94
 Flather, Mark, Planer Co. 26
 Foos Gas Engine Co. 105
 Foote Bros. Gear & Mch. Co. 108
 Foote, Burt, & Co. 109
 Foote, Pierson & Co. 65
 Foreign Machinery Merchants 12
 Fox Machine Co. 33-79
 Franklin Mfg. Co. 22
 Franklin Portable Crane & Hoist Co. 32
 Frasse, P. A., & Co. 26
 Fritz & Goedel Mfg. Co. 103
 Fuchs & Lang Mfg. Co. 108
- Ganschow, Wm. 108
 Gas Engine Publishing Co. 105
 General Pneumatic Tool Co. 80
 Geometric Tool Co. 117
 Giant Motor Co. 105
 Gilmer, L. H., & Co. 91
 Gisholt Machine Co. 10
 Gleason Works. Front cover-Back cover
- Globe Mch. & Stamping Co. 31
 Goddard Mch. Co. 106
 Goldschmidt-Thermit Co. Inside front cover
- Goodell-Pratt Co. 93
 Gould & Eberhardt 34
 Graham Mfg. Co. 114
 Grant Gear Works 108
 Grant Mfg. Co. 121
 Gray, G. A., Co. Inside front cover
- Greaves, Klusman & Co. 98
 Guarantee Electric Co. 105
- Hamilton Mch. Tool Co. 62
 Hammacher, Schlemmer & Co. 39
 Hampden Corundum Wheel Co. 107
 Hart Mfg. Co. 24
 Hay-Budden Mfg. Co. 31
 Hayes File Co. 26
 Heald Machine Co. 89
 Heller Bros. Co. 30
 Hendey Mch. Co. 13
 Henley, Norman W., & Son. 41
 Henry, F. G. 103
 Henry & Wright Mfg. Co. 63
 Hill-Standard Mfg. Co. 91
 Hisey-Wolf Mch. Co. 22
 Hoefler Mfg. Co. 85
 Hoffman, Geo. W. 120
 Hoggson & Pettis Mfg. Co. 117
 Hoist Mfg. & Construction Co. 102
 Holroyd & Co. 21
 Horsburg & Scott Co. 108
 Horton, E., & Son Co. 116
 Howson & Howson 103
 Hurlburt-Rogers Mch. Co. 122
- Industrial Novelty Co. 31
 Ingersoll Milling Mch. Co. 54
 Ingersoll-Sergeant Drill Co. 86
 International Corr. Schools. 17
 International Power Vehicle Co. 105
 International Specialty Co. 103
- Jacobs Mfg. Co. 116
 Jacobson Mch. Mfg. Co. 105
 Jeffrey Mfg. Co. 113
 Jenkins Bros. 119
 Jessop, Wm., & Sons, Ltd. 30
 Jones & Lamson Mch. Co. 69
- Kelly, R. A., Co. 97
 Kempsmith Mfg. Co. 86
 Kent, Edwin R., & Co. 30
- Keuffel & Esser Co. 102
 Keystone Drop Forge Works 110
 Kilbourne & Jacobs Mfg. Co. 88
 King Mch. Tool Co. 109
 Knecht Bros. Co. 34
 Krips-Mason Mch. Co. 119
- Landis Tool Co. 40
 Le Blond Mch. Tool Co. 21-63
 Link Belt Engineering Co. 80
 Lobdell Car Wheel Co. 113
 Lodge & Shipley Mch. Tool Co. 6
 Long & Allstatter Co. 90
 Lovejoy Co. 102
 Lucas Mch. Tool Co. 95
 Lufkin Rule Co. 28
 Lutz Tool Mfg. Co. 75
- Main Belting Co. 113
 Manning, Maxwell & Moore. 65
 Maris Bros. 58
 Mason, Volney W., & Co. 118
 Mattison, Jas. D. 89
 McCabe, J. J. 60
 McCullough-Dalzell Crucible Co. 122
 McGiehan, C. H., & Co. 26
 Merrell Mfg. Co. 121
 Merrell Bros. 114
 Merritt & Co. 101
 Milwaukee Fdry. Sup. Co. 111
 Millers Falls Co. Back cover
 Miner & Peck Mfg. Co. Back cover
- Mitts & Merrill 60
 Modern Tool Co. 117
 Moline Tool Co. 94
 Morse Chain Co. 81
 Morse, Williams & Co. 109
 Morse Twist Drill & Mch. Co. 68
 Morton Mfg. Co. 97
 Motch & Merryweather Mch. Co. 105
 Mueller Mch. Tool Co. 96
- Nash, Geo., & Co. 74
 National-Acme Mfg. Co. 27
 National Machinery Co. 22
 National Mch. Tool Co. 98
 National Separator & Mch. Co. 101
 National Twist D. & T. Co. 100
 New Britain Mch. Co. 103
 New Doty Mfg. Co. 67
 New Haven Mfg. Co. 97
 New Process Raw Hide Co. 76-77
 Newton Machine Tool Works 48
 New York Belting & Packing Co. 18
 Nicholson, W. H., & Co. 100
 Nicholson File Co. 34
 Niles-Bement-Pond Co. 4-5-94-104
 Northern Electrical Mfg. Co. 50
 Northern Engineering Works 84
 Norton Emery Wheel Co. 47
 Norton Grinding Co. 46
- Obermayer, S., Co. 85
 Ohio Pulley Co. 112
 O. K. Tool Holder Co. 84
 Olney & Warrin 97
 Onelda National Chuck Co. 115
 Oster Mfg. Co. 119
 Otto Gas Engine Works. 105
- Pawling & Harnischfeger. 84
 Paxson, J. W., Co. 101
 Pedrick & Ayer Co. 90
 Pedrick-Smith Co. 119
 Peerless Rubber Mfg. Co. 18
 Penn Pattern Wks. 103
 Philadelphia Gear Wks. 108
 Phillips Pressed Steel Pulley Works 84
 Phosphor Bronze Smelting Co. 30
 Pittsburg Blue Print Co. 102
 Poole Eng'g & Mch. Co. 113
 Poole, J. Morton, Co. 86
 Potter & Johnston Mch. Co. 83
 Pratt Chuck Co. 116
 Pratt Institute 99
 Pratt & Whitney Co. 4
 Prentice Bros. Co. Inside back cover
- Prentiss Tool & Supply Co. 64
 Prentiss Vise Co. 114
- Quint, A. E. 96
- Rand Drill Co. 87
 Reed, F. E., Co. 3
 Reed, Francis Co. 97
 Reed Mfg. Co. 114
 Reeves Pulley Co. 84
 Reichhelm, E. P., & Co. 55
 Reliance Mch. & Tool Co. 120
 Rich, Geo. R., Mfg. Co. 115
 Richards, I. P. 119
 Ridgway Dynamo & Engine Co. 49
- Rivett-Dock Co. 122
 Rivett Lathe Mfg. Co. 122
 Rogers, J. M., Boat, Gauge & Drill Works 61
 Rogers & Hubbard Co. 30
 Royersford Foundry & Mch. Co. 91
- Safety Emery Wheel Co. 107
 Saginaw Mfg. Co. 112
 Saunders, D., Sons 121
 Sawyer Tool Mfg. Co. 74
 Schellenbach & Radcliffe. 28
 Schumacher & Boye 16
 Schwerdtle Stamp Co. 100
 Scranton & Co. 111
 Sebastian Lathe Co. 98
 Second-Hand Machinery 104
 Sellers, Wm., & Co., Inc. 82
 Seneca Falls Mfg. Co. 94-99
 Sibley Mch. Tool Co. 96
 Skinner Chuck Co. 117
 Slocumb, J. T., Co. 75
 Smith, E. G. 101
 Smith, J. D., Fdry. Sup. Co. Back cover
- Smith & Mills 97
 Snyder, J. E., & Son. 3
 Spacke, F. W., Mch. Co. 86
 Spear, Middleton, Donaldson & Spear 103
 Springfield Mch. Tool Co. 44
 Standard Engineering Co. 121
 Standard Gauge Steel Co. 82
 Standard Pressed Steel Co. 110
 Standard Roller Bearing Co. 33-116
 Standard Tool Co. 43-92
 Standard Welding Co. 73
 Stark Tool Co. 89
 Starrett, L. S., Co. 70
 Steel Set Diamond Co. 98
 Steffy Mfg. Co. 105
 Steptoe, John, Shaper Co. Inside front cover
- Sterling Emery Wheel Mfg. Co. 106
 Stevens, Milo B., & Co. 103
 Stewart Heater Co. 118
 Stockbridge Machine Co. 96
 Stoever Fdry. & Mfg. Co. 120
 Story, H. T. 114
 Stow Flexible Shaft Co. 120
 Stow Mfg. Co. 99
 Sturtevant, B. F., Co. 51
 Sutton, C. E., Co. 91
 Syracuse Twist Drill Co. 114
- Tabor Mfg. Co. 89
 Three Rivers Tool Co. 29
 Toledo Machine & Tool Co. 103
 Toomey, Frank 104
 Trimont Mfg. Co. 85
 Trump Bros. Mch. Co. 99
 Tucker, W. M. & C. F. 31
 Turner Brass Wks. 31
- Underwood, H. B., & Co. 3
 Union Twist Drill Co. 46
 U. S. Elec. Tool Co. 25
- Valley Iron Works 29
 Van Dorn & Dutton Co. 108
 Vitrified Wheel Co. 107
 Von Wyck Mch. Tool Co. 94
- Wagenhorst, J. H., & Co. 102
 Walcott, Geo. D., & Son. 72
 Walker Grinder Co. Back cover
 Wallace Supply Co. 121
 Waltham Watch Tool Co. 99
 Warner Instrument Co. 67
 Warner & Swasey Co. 32
 Waterbury-Farrel, F. & M. Co. 34
 Watson-Stillman Co. 90
 Westcott Chuck Co. 116
 Western Tool & Mfg. Co. 100
 West Haven Mfg. Co. 88
 Westinghouse Elec. & Mfg. Co. 49
 Whitcomb-Blaisdell Mch. Tool Co. 45
 Whitman & Barnes Mfg. Co. 101
 Whitney Mfg. Co. 76
 Whiton, D. E., Mch. Co. 66
 Whittlesey, Geo. P. 103
 Wiley, John, & Sons 34
 Wiley & Russell Mfg. Co. 75
 Williams Elec. Mch. Co. 88
 Williams, J. H., & Co. 111
 Williams Tool Co. 121
 Wilmarth & Morman Co. 96
 Wilson, W. A., Mch. Co. 34
 Windsor Mch. Co. 78
 Winkley Co. 31
 Wittman, A. P., & Co. 101
 Woodman, R., Mfg. & Sup. ply Co. 118
 Wood's Sons, T. B. 112
 Wyke, J., & Co. 115
 Wyman & Gordon. Inside front cover
- Yale & Towne Mfg. Co. 80

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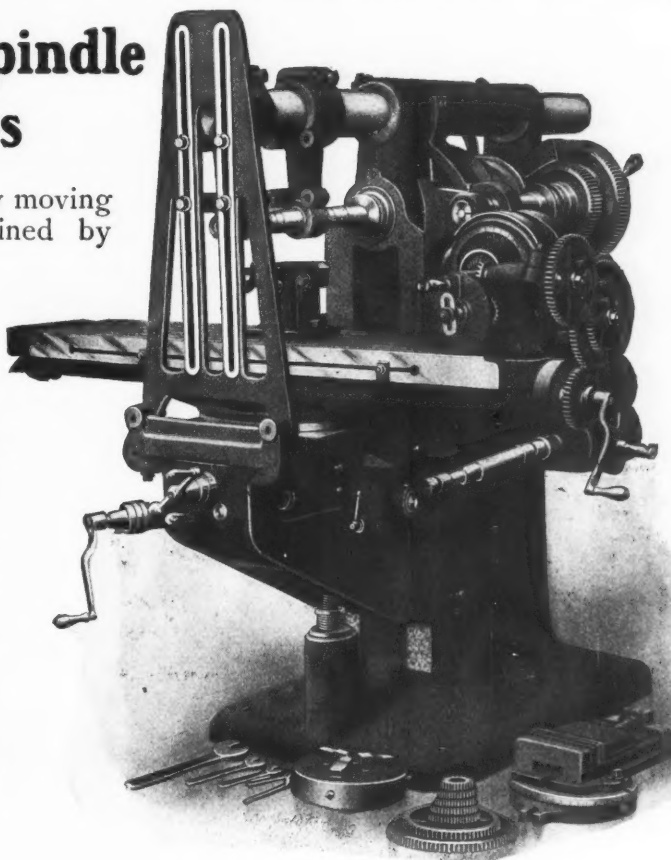
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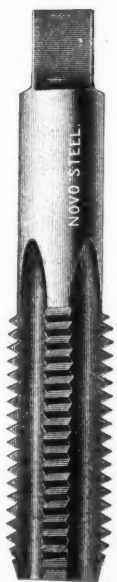
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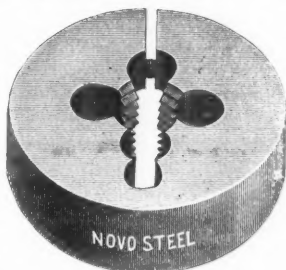
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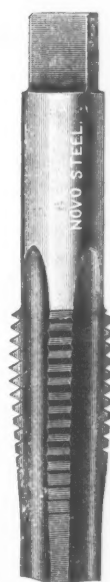
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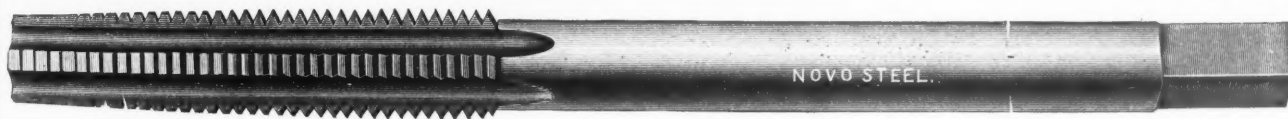


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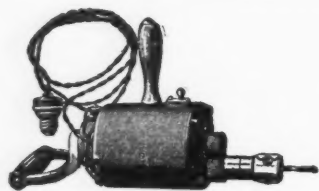


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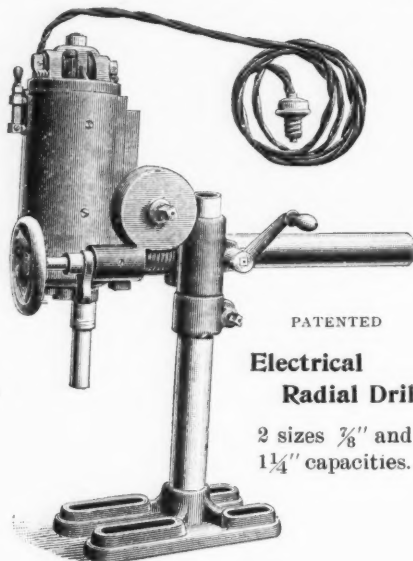
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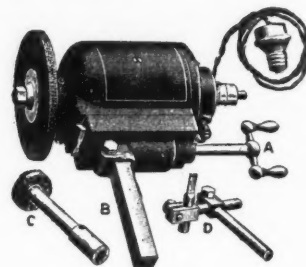
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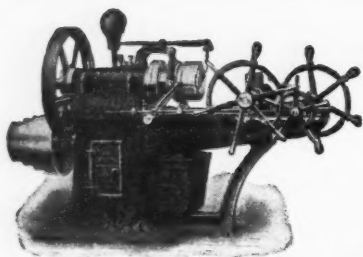
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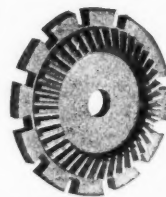


Do You Make Machine Parts in Quantities?

The small, fussy kind of pieces that must be accurate to 100th part of an inch—odd shaped parts for machines, novelties, etc.? You know how these things run into money when you machine them, but do you know the economy of having them cast by the Franklin process? Better write us about it, we can save you time and money.

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The Industrial Press,

66-70 West
Broadway,
New York.

Classified Index to Advertisements.**Air Compressors.**

Curtis & Co. Mfg. Co., St. Louis, Mo.
 Ingersoll-Sergeant Drill Co., New York.
 Jacobson Mch. Mfg. Co., Warren, Pa.
 Manning, Maxwell & Moore, New York.
 Rand Drill Co., New York.
 Spacke, F. W., Mch. Co., Indianapolis, Ind.

Air Hoists.

Curtis & Co. Mfg. Co., St. Louis, Mo.
 General Pneumatic Tool Co., Montour Falls, N. Y.
 Northern Engineering Wks., Detroit, Mich.

Air Motors.

Stow Flexible Shaft Co., Philadelphia, Pa.

Arbor Presses.

Fox Mch. Co., Grand Rapids, Mich.
 Lucas Mch. Tool Co., Cleveland, O.
 Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Balancing Ways.

Bowsher, N. P., Co., South Bend, Ind.

Ball Bearing.

Auburn Ball Bearing Co., Rochester, N. Y.
 Ball Bearing Co., Philadelphia, Pa.
 Bantam Anti-Friction Co., Bantam, Conn.
 Standard Roller Bearing Co., Philadelphia, Pa.

Balls, Steel.

American Ball Co., Providence, R. I.
 Ball Bearing Co., Philadelphia, Pa.
 Standard Roller Bearing Co., Philadelphia, Pa.

Barrows.

Kilbourne & Jacobs Mfg. Co., Columbus, O.

Belt Filler.

Cling-Surface Co., Buffalo, N. Y.

Belting.

Gilmer, L. H., & Co., Philadelphia.
 Main Belting Co., Philadelphia, Pa.

Belting, Rubber.

New York Belting & Packing Co., New York.

Belt Lacing Machines.

Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.

Bending Tools, Hand.

Wallace Supply Co., Chicago, Ill.

Blowers.

American Blower Co., Detroit, Mich.
 De Laval Steam Turbine Co., Trenton, N. J.
 B. F. Sturtevant Co., Hyde Park, Mass.

Blue Print Machines.

Eugene Dietzgen Co., Chicago, Ill.
 Keuffel & Esser Co., New York.
 Pittsburg Blue Print Co., Pittsburg, Pa.
 Wagenhorst, J. H. & Co., Youngstown, O.

Bolt Cutters.

Acme Machinery Co., Cleveland, O.
 Brown, H. B., Co., East Hampton, Conn.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 National Mch. Co., Tiffin, O.
 Pratt & Whitney Co., Hartford, Conn.
 Reliance Mch. & Tool Co., Cleveland, O.
 Wiley & Russell Mfg. Co., Greenfield, Mass.

Bolt and Nut Machinery.

Acme Machinery Co., Cleveland, O.
 Brown, H. B., Co., East Hampton, Conn.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Grant Mfg. Co., Bridgeport, Conn.
 National Mch. Co., Tiffin, O.
 Standard Engineering Co., Ellwood City, Pa.
 Waterbury-Parrel Fdry. & Mch. Co., Waterbury.

Boring Bars.

Pedrick & Ayer Co., Plainfield, N. J.
 H. B. Underwood & Co., Philadelphia, Pa.

Boring Machines.

Beaman & Smith Co., Providence, R. I.
 Betts Mch. Co., Wilmington, Del.
 Binasse Mch. Co., Newark, N. J.
 Davis, W. P., Mch. Co., Rochester, N. Y.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 King Mch. Tool Co., Cincinnati, O.
 Lucas Mch. Tool Co., Cleveland, O.
 Pawling & Harnischfeger, Milwaukee, Wis.
 Pond Mch. Tool Co., New York.
 Sellers, Wm., & Co., Inc., Philadelphia, Pa.
 Three Rivers Tool Co., Three Rivers, Mich.
 Warner & Swasey Co., Cleveland, O.

Boring Mills.

Baush Mch. Tool Co., Springfield, Mass.
 Betts Mch. Co., Wilmington, Del.
 Bickford, H., & Co., Lakeport, N. H.
 Bullard Mch. Tool Co., Box 3051, Bridgeport.
 Colburn Mch. Tool Co., Franklin, Pa.
 Gisholt Mch. Co., Madison, Wis.
 Pond Mch. Tool Co., New York.
 Poole, J. Morton, Co., Wilmington, Del.
 Sellers, Wm., & Co., Inc., Philadelphia, Pa.
 Three Rivers Tool Co., Three Rivers, Mich.
 Warner & Swasey Co., Cleveland, O.

Boring Tools.

Armstrong Bros. Tool Co., Chicago, Ill.
 Carr Bros., Syracuse, N. Y.
 Cleveland Twist Drill Co., Cleveland, O.
 Hill-Standard Mfg. Co., Anderson, Ind.

Bulldozers.

National Mch. Co., Tiffin, O.

Cabinets, Blue Prints.

Fritz & Goedel Mfg. Co., Grand Rapids, Mich.

Calipers. (See Machinists' Small Tools.)**Carborundum Wheels.**

Carborundum Co., Niagara Falls, N. Y.

Case Hardening.

Rogers & Hubbard Co., Middletown, Conn.

Castings.

Erie Forge Co., Erie, Pa.
 Fuchs & Lang Mfg. Co., New York.
 Lobdell Car Wheel Co., Wilmington, Del.
 Phosphor Bronze Smelting Co., Philadelphia, Pa.

Casting, Finished.

Franklin Mfg. Co., Syracuse, N. Y.

Center Grinders.

Heald Mch. Co., Worcester, Mass.
 Haeys-Wolf Mch. Co., Cincinnati, O.
 Trump Bros. Mch. Co., Wilmington, Del.

Centering Machines.

Springfield Mch. Tool Co., Springfield, O.
 D. E. Whiton Mch. Co., New London, Conn.

For Alphabetical Index, see Page 20.

THE JACKSON BELT LACER



Laces a 5-inch
belt in three
minutes.
Cost—one
cent.
Larger belts
in
proportion.

Lacing won't
break, won't
pull apart and
passes over
the smallest
pulley without
noise, slipping
or friction.

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Semi-Steel Castings
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BIRDSBORO STEEL FOUNDRY AND MACHINE CO.

FORMERLY CALLED DIAMOND DRILL AND MACHINE CO.

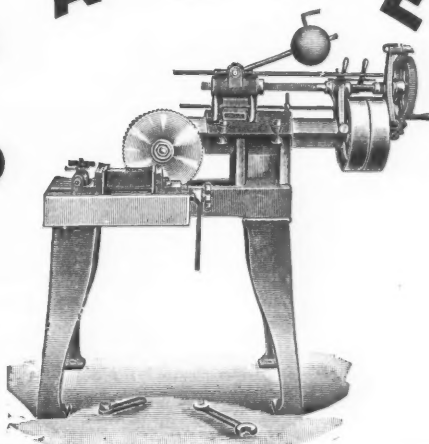
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Punching and Shearing Machines
Hydraulic Machinery
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Head
swivels--
cuts
any
angle.

Built in
seven
sizes,
beds
to suit
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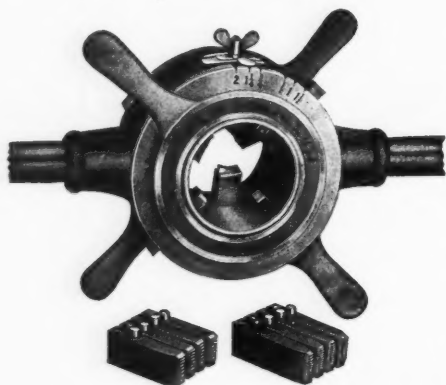


A well made steel chain, running on properly milled sprockets, will last much longer and prove much more efficient than a short belt. The truth of this is well demonstrated wherever milling machine feed belts have been replaced by chains. The substitution has put an end to irregular feeds and other troubles.

We solicit the manufacture of chains for special purposes.

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Combine all the good features of quick adjustability in dies and guides in the simplest and most practical manner.

They cut threads to go together just as wanted.

They are easily operated because the dies cut freely and without drag.

They work quickly because the quick opening dies release the work at the end of the thread, thus obviating running back over finished work.

Dies are as easily sharpened as the every day cold chisel. All adjustments made without the aid of wrench or screw driver.

Write us for latest Catalogue of Thread Cutting Tools.

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*ENGINE WORK is right in our line.
We have the tools and experience
needed to turn out GOOD WORK.*

The Blanchard Machine Co., Boston Mass

Classified Index to Advs. (Continued)

- Chains.**
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Jeffrey Mfg. Co., Columbus, O.
- Chains, Driving.**
Morse Chain Co., Trumansburg, N. Y.
- Chain Blocks, Differential, Duplex and Triplex.**
Yale & Towne Mfg. Co., New York.
- Chucks.**
T. R. Almond Mfg. Co., Brooklyn, N. Y.
R. H. Brown & Co., New Haven, Conn.
Cushman Chuck Co., Hartford, Conn.
E. Horton & Son Co., Windsor Locks, Conn.
Hoggson & Pettis Mfg. Co., New Haven, Conn.
Jacobs Mfg. Co., Hartford, Conn.
Morse Twist Drill & Mch. Co., New Bedford.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt Chuck Co., Frankfort, N. Y.
Francis Reed Co., Worcester, Mass.
Rich, Geo. R., Mfg. Co., Buchanan, Mich.
Skinner Chuck Co., New Britain, Conn.
Standard Tool Co., Cleveland, O.
Westcott Chuck Co., Oneida, N. Y.
D. E. Whiton Mch. Co., New London, Conn.
Whitney Mfg. Co., Hartford, Conn.
- Clutches, Electric.**
Williams Elec. Mch. Co., Akron, O.
- Clutches, Friction.**
H. W. Caldwell & Son Co., Chicago.
Carlyle Johnson Mch. Co., Hartford, Conn.
Jacobson Mch. Mfg. Co., Warren, Pa.
Wood's Sons, T. B., Chambersburg, Pa.
- Clutches, Magnetic.**
Cutler-Hammer Clutch Co., Milwaukee, Wis.
Elec. Controller & Supply Co., Cleveland, O.
- Cold Saw Cutting-off Machines.**
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
John T. Barr & Son, Brooklyn, N. Y.
Hill-Standard Mfg. Co., Anderson, Ind.
- Controllers.**
Elec. Controller & Supply Co., Cleveland, O.
- Core Ovens.**
S. Obermayer Co., Cincinnati, O.
- Coupling.**
W. P. Davis Mch. Co., Rochester, N. Y.
Wood's Sons, T. B., Chambersburg, Pa.
- Cranes.**
Browning Engineering Co., Cleveland, O.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.
Curtis & Co. Mfg. Co., St. Louis, Mo.
Franklin Portable Crane & Hoist Co., Franklin.
General Pneu. Tool Co., Montour Falls, N. Y.
Hoist Mfg. & Construction Co., Philadelphia, Pa.
Manning, Maxwell & Moore, New York.
Maris Bros., Philadelphia, Pa.
Niles Tool Works, New York.
Northern Engineering Wks., Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
Pawling & Harnischfeger, Milwaukee, Wis.
Wm. Sellers & Co., Inc., Philadelphia, Pa.
Yale & Towne Mfg. Co., New York.
- Crucibles.**
McCullough-Dalzell Crucible Co., Pittsburg, Co.
S. Obermayer Co., Cincinnati, O.
- Cupolas.**
Northern Engineering Wks., Detroit, Mich.
S. Obermayer Co., Cincinnati, O.
- Cutting-off Machines.**
Bignall & Keeler Mfg. Co., Edwardsville, Ill.
W. P. Davis Mch. Co., Rochester, N. Y.
Espan-Lucas Mch. Wks., Philadelphia, Pa.
Fox Mch. Co., Grand Rapids, Mich.
Hurlbut-Rogers Mch. Co., So. Sudbury, Mass.
Merrell Mfg. Co., Toledo, O.
Pond Mch. Tool Co., New York.
Pratt & Whitney Co., Hartford, Conn.
Wm. Sellers & Co., Inc., Philadelphia, Pa.
Standard Engineering Co., Ellwood City, Pa.
Stoeber Fdry. & Mfg. Co., Myerstown, Pa.
Warner & Swasey Co., Cleveland, O.
- Cut Meters.**
Warner Instrument Co., Beloit, Wis.
- Diamond Tools.**
Dickinson, Thos. L., New York.
Steel Set Diamond Co., New York.
- Dies. (See Taps and Dies.)**
- Die Heads, Self-Opening and Adjustable.**
Geometric Tool Co., New Haven, Conn.
Modern Tool Co., Erie, Pa.
- Die Stocks. (See Pipe Cutting Tools.)**
- Dowel Pins, Brass.**
The Winkley Co., Hartford, Conn.
- Drawing Tables.**
Eugene Dietzgen Co., Chicago, Ill.
Fritz & Goedel Mfg. Co., Grand Rapids, Mich.
Keuffel & Esser Co., New York.
- Drawing Outfit.**
Eugene Dietzgen Co., Chicago, Ill.
Keuffel & Esser Co., New York.
- Drill Grinders.**
Heald Mch. Co., Worcester, Mass.
Pratt & Whitney Co., Hartford, Conn.
Wilmarth & Morman Co., Grand Rapids, Mich.
- Drills, Rock.**
Ingersoll-Sergeant Drill Co., New York.
Northern Elec. Mfg. Co., Madison, Wis.
Rand Drill Co., New York.
- Drills, Twist.**
Boker, Hermann, & Co., New York and Chicago.
Cleveland Twist Drill Co., Cleveland, O.
Detroit Twist Drill Co., Detroit, Mich.
Kent, Edwin R., & Co., Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford.
National Twist Drill & Tool Co., Detroit, Mich.
Pratt & Whitney Co., Hartford, Conn.
Standard Tool Co., Cleveland, O.
Syracuse Twist Drill Co., Syracuse, N. Y.
Three Rivers Tool Co., Three Rivers, Mich.
Whitman & Barnes Mfg. Co., Chicago, Ill.

For Alphabetical Index, see Page 20.

Classified Index to Advt's. (Continued).

Drilling Machines.

American Tool Wks., Cincinnati, O.
 Andrew, M. L., & Co., Cincinnati, O.
 Baker Bros., Toledo, O.
 B. F. Barnes Co., Rockford, Ill.
 W. F. & J. Barnes Co., Rockford, Ill.
 H. G. Barr, Worcester, Mass.
 Baush Mch. Tool Co., Springfield, Mass.
 Betts Mch. Co., Wilmington, Del.
 Bickford Drill & Tool Co., Cincinnati, O.
 P. Blaisdell & Co., Worcester, Mass.
 Burke Mch. Co., Cleveland, O.
 Cincinnati Mch. Tool Co., Cincinnati, O.
 Cincinnati & Harvey Mch. Co., Baltimore, Md.
 Detrick & Tool Co., Cincinnati, O.
 Drees Mch. Co., Lowell, Mass.
 Duff Mch. Co., Hartford, Conn.
 Dwight Slate Mch. Co., Cleveland, O.
 Foote, Burt & Co., Cleveland, O.
 Fox Mch. Co., Grand Rapids, Mich.
 Godel-Pratt Co., Greenfield, Mass.
 Gould & Eberhardt, Newark, N. J.
 Hamilton Mch. Tool Co., Hamilton, O.
 Henry & Wright Mfg. Co., Hartford, Conn.
 Knecht Bros. Co., Cincinnati, O.
 Moline Tool Co., Moline, Ill.
 Montgomery & Co., New York.
 Mueller Mch. Tool Co., Cincinnati, O.
 New Haven Mfg. Co., New Haven, Conn.
 Pawling & Harnischfeger, Milwaukee, Wis.
 Pond Mch. Tool Co., New York.
 Pratt & Whitney Co., Hartford, Conn.
 Prentice Bros. Co., Worcester, Mass.
 A. E. Quint, Hartford, Conn.
 Francis Reed Co., Worcester, Mass.
 Sibley Mch. Tool Co., So. Bend, Ind.
 J. E. Snyder & Son, Worcester, Mass.
 Wiley & Russell Mfg. Co., Greenfield, Mass.
 Whitcomb-Blaisdell Mch. Tool Co., Worcester.

Drilling Machines, Portable, Electrical Driven.
 Clark, Jas., Jr. & Co., Louisville, Ky.
 Hisey-Wolf Mch. Co., Cincinnati, O.
 Stow Flexible Shaft Co., Philadelphia, Pa.
 United States Elec. Tool Co., Cincinnati, O.

Dynamos.

Blissell, F. Co., Toledo, O.
 Crocker-Wheeler Co., Ampere, N. J.
 Cutler-Hammer Clutch Co., Milwaukee, Wis.
 Eck Dynamo & Motor Wks., Belleville, N. J.
 Electro-Dynamic Co., Bayonne, N. J.
 Northern Electrical Mfg. Co., Madison, Wis.
 Ridgway Dynamo & Engine Co., Ridgway, Pa.
 B. F. Sturtevant Co., Hyde Park, Mass.
 Western Tool and Mfg. Co., Springfield, O.
 Westinghouse Elec. & Mfg. Co., Pittsburg, Pa.

Electrotypers.

Lovejoy Co., New York.

Elevators.

Morse Elevator Wks., Philadelphia, Pa.

Emery Wheels.

Abrasive Material Co., Philadelphia, Pa.
 Bridgeport Safety Emery Wheel Co., Bridgeport.
 Corrugated Grinding Wheel Co., Philadelphia, Pa.
 Hampden Corundum Wheel Co., Brightwood, Mass.
 Norton Emery Wheel Co., Worcester, Mass.
 Safety Emery Wheel Co., Springfield, O.
 Sterling Emery Wheel Mfg. Co., Tiffin, O.
 Vitriified Wheel Co., Westfield, Mass.

Emery Wheel Dresser.

Geo. H. Calder, Lancaster, Pa.
 Desmond-Stephan Mfg. Co., Urbana, O.
 T. L. Dickinson, New York.
 International Specialty Co., Detroit, Mich.
 Morton Mfg. Co., Muskegon Heights, Mich.
 Standard Tool Co., Cleveland, O.
 Steel Set Diamond Co., New York.

Engines.

American Blower Co., Detroit, Mich.
 New Britain Mch. Co., New Britain, Conn.
 Ridgway Dynamo & Engine Co., Ridgway, Pa.
 B. F. Sturtevant Co., Hyde Park, Mass.

Engines, Gas, Gasoline and Oil.

Brown-Cochran Co., Lorain, O.
 Columbus Mch. Co., Columbus, O.
 Foos Gas Engine Co., Springfield, O.
 International Power Vehicle Co., Stamford, Conn.
 Jacobson Mch. Mfg. Co., Warren, Pa.
 Otto Gas Engine Wks., Philadelphia, Pa.

Engineering Appliances.

Crane Co., Chicago, Ill.

Exhaust Heads.

B. F. Sturtevant Co., Hyde Park, Mass.

Fans, Exhaust, Electric, Ventilating.

American Blower Co., Detroit, Mich.
 B. F. Sturtevant Co., Hyde Park, Mass.

Fibre Calendering Machinery.

Loddell Car Wheel Co., Wilmington, Del.

Files.

G. & H. Barnett Co., Philadelphia, Pa.
 Hammacher, Schlemmer & Co., New York.
 Hayes File Co., Detroit, Mich.
 Montgomery & Co., New York.
 Nicholson File Co., Providence, R. I.
 Reichhelm, E. P., & Co., New York.

Filing Machine.

Cochrane-Bly Co., Rochester, N. Y.

Fillet Cutters.

Milwaukee Foundry Supply Co., Milwaukee, Wis.

Fillet. (Leather.)

Butler, A. G., New York.
 S. Obermayer Co., Cincinnati, O.

Flasks.

S. Obermayer Co., Cincinnati, O.

Flexible Shafts.

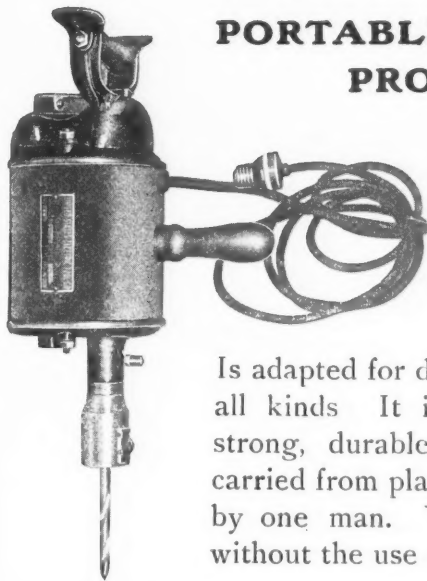
Coates Clipper Mfg. Co., Worcester, Mass.
 Stow Flexible Shaft Co., Philadelphia, Pa.
 Stow Mfg. Co., Binghamton, N. Y.

Forges.

Billings & Spencer Co., Hartford, Conn.
 B. F. Sturtevant Co., Hyde Park, Mass.

For Alphabetical Index, see Page 20.

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SENT ON TRIAL**PORTABLE, POWERFUL,
PROFITABLE.****The U. S. Portable
Electrical Driven
Hand Drill**

Is adapted for drilling wood and metal of all kinds. It is simple in construction, strong, durable, light in weight, easily carried from place to place and operated by one man. Variable speed obtained without the use of gears. Made in 5 sizes.

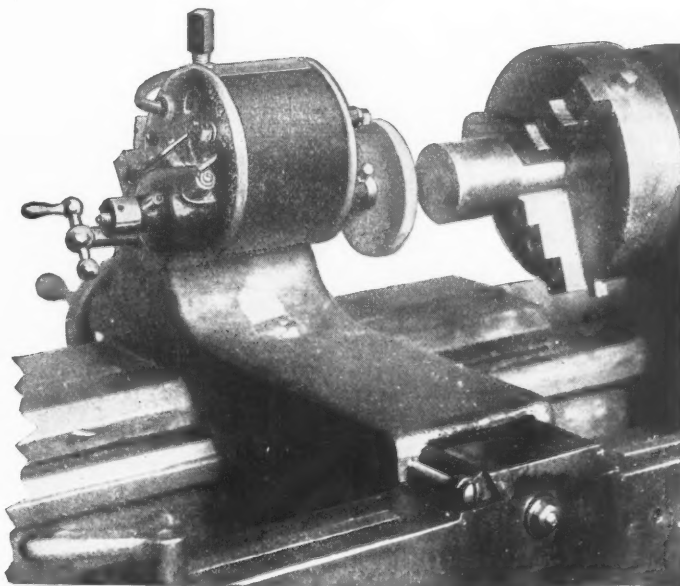
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Current must be direct.**

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Are equally efficient and convenient and save more time than any other tool in the shop. Useful for grinding centers, reamers, dies, for internal grinding and parallel grinding—universal tools. Bearings adjustable to wear.

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United States Electric Tool Co.

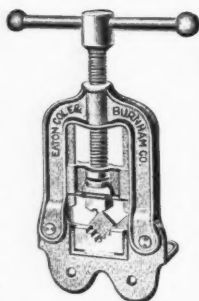
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For hand or power. Arranged for engine or motor drive as desired. Capacities from $\frac{1}{8}$ " to 12".



Stocks and Dies Tongs, Wrenches

and other tools for pipe fitters' use. Our small tools are made of best material and will give the longest service.

Pipe Tools of all Kinds - - Standard Sizes.
Power Machines, rapid and efficient.

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Fittings

SEND FOR SPECIAL PIPE TOOL CIRCULAR



Poldi Diamond High Speed Steel

Made in Austria

Will do more work than any other now on the market.

A trial will convince the user that this is the most economical to use, notwithstanding the fact that it costs a few cents more than some others.

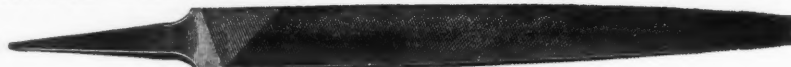
Poldi Extra Cast Steel for general work is not equalled by any other sold at a like price or $33\frac{1}{3}\%$ higher.

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or somebody to work out your ideas, get up models, make your work practical and reduce manufacturing costs? We are the people. Send us your address and let us make suggestions.

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Colvin & Cheney. Shows how to make any calculation needed in the shop and tells why it is done. Price 50 cents Sent post-paid for one new subscription to MACHINERY, Engineering Edition, for six months or Shop Edition for one year.

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Erie Forge Co., Erie, Pa.
Hay-Budden Mfg. Co., Brooklyn, N. Y.
Phosphor Bronze Smelting Co., Philadelphia, Pa.

Forgings, Drop.

Billings & Spencer Co., Hartford, Conn.
Clapp, E. D., Mfg. Co., Auburn, N. Y.
Keystone Drop Forge Wks., Chester, Pa.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
J. H. Williams & Co., Brooklyn, N. Y.

Forging Machines.

Seranton & Co., New Haven, Conn.

Foundry Facings, Brushes, Barrows, Shovels, Bel- lows and Blowers.

S. Obermayer Co., Cincinnati, O.
Paxson, J. W., & Co., Philadelphia, Pa.
J. D. Smith Fdry. Sup. Co., Cleveland, O.

Foundry Supplies.

Milwaukee Foundry Supply Co., Milwaukee, Wis.
S. Obermayer Co., Cincinnati, O.
Paxson, J. W., & Co., Philadelphia, Pa.
J. D. Smith Fdry. Sup. Co., Cleveland, O.

Friction Cone Pulleys.

G. F. Evans, Newton Center, Mass.

Fuel Economizers.

B. F. Sturtevant Co., Hyde Park, Mass.

Furnaces.

Burke Mch. Co., Cleveland, O.

Furnaces, Electric.

American Gas Furnace Co., New York.
Chicago Flexible Shaft Co., Chicago, Ill.
Wittman, A. P., & Co., Philadelphia, Pa.

Gauges, Surface, etc.

Brown & Sharpe Mfg. Co., Providence, R. I.
Hoggson & Pettis Mfg. Co., New Haven, Conn.
Pratt & Whitney Co., Hartford, Conn.
John M. Rogers B., G. & D. Wks., Gloucester City, N. J.
Sawyer Tool Mfg. Co., Fitchburg, Mass.
J. T. Slocumb Co., Providence, R. I.
E. G. Smith, Columbia, Pa.
L. S. Starrett Co., Athol, Mass.
J. Wyke & Co., Boston, Mass.

Gears.

Arthur Co., New York.
Hugo Bilgram, Philadelphia, Pa.
Boston Gear Wks., Boston, Mass.
H. W. Caldwell & Son Co., Chicago, Ill.
Cullman Wheel Co., Chicago, Ill.
Eberhardt Bros. Mch. Co., Newark, N. J.
Foote Bros. Gear & Mch. Co., Chicago, Ill.
Wm. Ganschow, Chicago, Ill.
Gleason Works, Rochester, N. Y.
Grant Gear Wks., Boston, Mass.
Jeffrey Mfg. Co., Columbus, O.
New Process Raw Hide Co., Syracuse, N. Y.
Philadelphia Gear Wks., Philadelphia, Pa.
Van Dorn & Dutton Co., Cleveland, O.

Gearing.

Earle Gear and Mch. Co., Philadelphia, Pa.
Eberhardt Bros. Mch. Co., Newark, N. J.
Morse Elevator Wks., Philadelphia, Pa.
Standard Gauge Steel Co., Beaver Falls, Pa.

Gear-Cutting Machines.

Becker-Brainard Milling Mch. Co., Hyde Park.
F. H. Bultman & Co., Cleveland, O.
Gleason Works, Rochester, N. Y.
Gould & Eberhardt, Newark, N. J.
Pratt & Whitney Co., Hartford, Conn.
Van Dorn & Dutton Co., Cleveland, O.
D. E. Whiton Mch. Co., New London, Conn.

Gear Planer, Bevel.

Gleason Works, Rochester, N. Y.

Gear Shapers.

Fellows Gear Shaper Co., Springfield, Vt.

Graphite.

Jos. Dixon Crucible Co., Jersey City, N. J.
S. Obermayer Co., Cincinnati, O.

Grinders, Portable Electrical Driven.

Clark, Jas. Jr., & Co., Louisville, Ky.
Heald Mch. Co., Worcester, Mass.
Hisey-Wolf Mch. Co., Cincinnati, O.

Grinding Machinery.

B. F. Barnes Co., Rockford, Ill.
W. F. & John Barnes Co., Rockford, Ill.
Bath Grinder Co., Fitchburg, Mass.
Becker-Brainard M. Mch. Co., Hyde Park, Mass.
C. H. Besly & Co., Chicago, Ill.
Bridgeport Safety Emery Wheel Co., Bridgeport.
Brown & Sharpe Mfg. Co., Providence, R. I.
Builders' Iron Foundry, Providence, R. I.
Diamond Mch. Co., Providence, R. I.
Gould & Eberhardt, Newark, N. J.
Hisey-Wolf Mch. Co., Cincinnati, O.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Montgomery & Co., New York.
Norton Emery Wheel Co., Worcester, Mass.
Norton Grinding Co., Worcester, Mass.
Pratt & Whitney Co., Hartford, Conn.
Safety Emery Wheel Co., Springfield, O.
Wm. Sellers & Co., Inc., Philadelphia, Pa.
Stow Flexible Shaft Co., Philadelphia, Pa.
Stow Mfg. Co., Binghamton, N. Y.
Whitney Mfg. Co., Hartford, Conn.

Hammers, Electric.

Northern Elec. Mfg. Co., Madison, Wis.

Hammers, Power, Steam and Drop.

Beaudry & Co., Philadelphia, Pa.
Bement, Miles & Co., Philadelphia, Pa.
Billings & Spencer Co., Hartford, Conn.
E. W. Bliss Co., Brooklyn, N. Y.
Bradley, C. C., & Son, Syracuse, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Dienelt & Eisenhardt, Philadelphia, Pa.
Merrill Bros., Brooklyn, N. Y.
Pratt & Whitney Co., Hartford, Conn.

For Alphabetical Index, see Page 20.

Classified Index to Advt's. (Continued).

Scranton & Co., New Haven, Conn.
Toledo Mch. & Tool Co., Toledo, O.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.

Hardening and Tempering.

American Gas Furnace Co., New York.
Chicago Flexible Shaft Co., Chicago, Ill.
Coes Wrench Co., Worcester, Mass.

Heading, Upsetting and Forging Machines.

Acme Machinery Co., Cleveland, O.
Brown, H. B., Co., East Hampton, Conn.

Heating Machines.

American Gas Furnace Co., New York.
Chicago Flexible Shaft Co., Chicago, Ill.

Heating and Ventilating, Dust Collecting Systems.

American Blower Co., Detroit, Mich.
Jeffrey Mfg. Co., Columbus, O.
B. F. Sturtevant Co., Hyde Park, Mass.

Heaters.

American Blower Co., Detroit, Mich.
Jeffrey Mfg. Co., Columbus, O.
B. F. Sturtevant Co., Hyde Park, Mass.

Heaters and Purifiers.

Stewart Heater Co., Buffalo, N. Y.

Hoists.

Volney W. Mason & Co., Providence, R. I.
J. D. Smith Fdry. Sup. Co., Cleveland, O.

Hoists, Pneumatic.

Curtis & Co. Mfg. Co., St. Louis, Mo.
General Pneumatic Tool Co., Montour Falls, N. Y.
Northern Engineering Co., Detroit, Mich.
Rand Drill Co., New York.
Stow Flexible Shaft Co., Philadelphia, Pa.

Hoists, Traveling and Electric.

Northern Engineering Co., Detroit, Mich.
Pawling & Harnischfeger, Milwaukee, Wis.

Hydraulic Machinery.

Chambersburg Engineering Co., Chambersburg, Pa.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
Watson-Stillman Co., New York.

Hydraulic Tools.

Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Elmes, Chas. F., Eng'g. Wks., Chicago, Ill.
Watson-Stillman Co., New York.

Index Center.

Stockbridge Mch. Co., Worcester, Mass.

Indicators.

L. S. Starrett Co., Athol, Mass.
R. Woodman Mfg. & Supply Co., Boston, Mass.

Injectors.

Jenkins Bros., New York.

Jacks.

Dieuelt & Eisenhardt, Philadelphia, Pa.
Watson-Stillman Co., New York.

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Baker Bros., Toledo, O.
John T. Burr & Son, Brooklyn, N. Y.
W. P. Davis Mch. Co., Rochester, N. Y.
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Morton Mfg. Co., Muskegon Heights, Mich.
National Mch. Tool Co., Cincinnati, O.

Lathes.

American Tool Works Co., Cincinnati, O.
Baird Mch. Co., Pittsburg, Pa.
B. F. Barnes Co., Rockford, Ill.
W. F. & J. Barnes Co., Rockford, Ill.
Bradford Machine Tool Co., Cincinnati, O.
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Mch. Tool Co., Box 3051, Bridgeport.
W. P. Davis Mch. Co., Rochester, N. Y.
Detrick & Harvey Mch. Co., Baltimore, Md.
Fay & Scott, Dexter, Me.
Flather & Co., Nashua, N. H.
Gisholt Mch. Co., Madison, Wis.
Goddard Mch. Co., Holyoke, Mass.
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Greaves, Klusman & Co., Cincinnati, O.
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Hendey Mch. Co., Torrington, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
R. K. Le Blond Mch. Tool Co., Cincinnati, O.
Lodge & Shipley Mch. Tool Co., Cincinnati, O.
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Montgomery & Co., New York.
New Haven Mfg. Co., New Haven, Conn.
Pond Mch. Tool Co., New York.
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Schumacher & Boye, Cincinnati, O.
Sebastian Lathe Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
Springfield Mch. Tool Co., Springfield, O.
Stark Tool Co., Waltham, Mass.
Von Wyck Mch. Tool Co., Cincinnati, O.
George D. Walcott & Son, Jackson, Mich.
Warner & Swasey Co., Cleveland, O.
Whitecomb-Blaisdell Mch. Tool Co., Worcester.

Lathe Attachments.

National Mch. Tool Co., Cincinnati, O.

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Elgin Tool Wks., Elgin, Ill.
R. K. Le Blond Mch. Tool Co., Cincinnati, O.
O. K. Tool Holder Co., Shelton, Conn.
Pratt & Whitney Co., Hartford, Conn.
Wiley & Russell Mfg. Co., Greenfield, Mass.

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Merritt & Co., Philadelphia, Pa.

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Joseph Dixon Crucible Co., Jersey City, N. J.

Lubricating Compound.

Foot, Pierson & Co., New York.

Machine Keys.

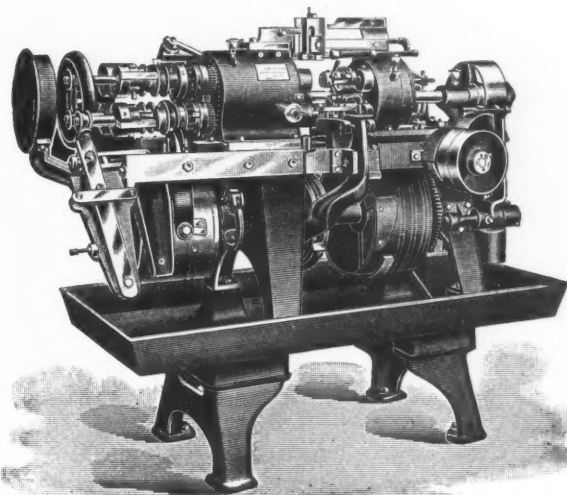
Morton Mfg. Co., Muskegon Heights, Mich.
Olney & Warrin, New York.
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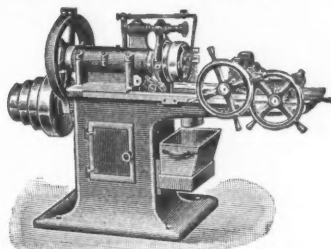
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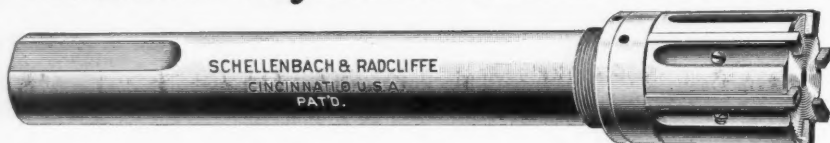
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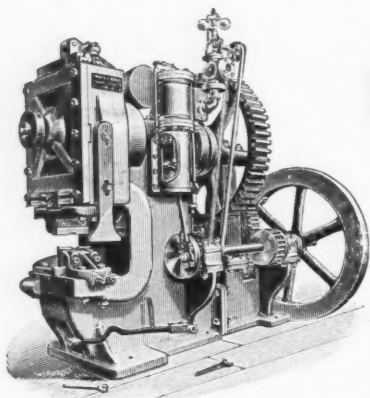
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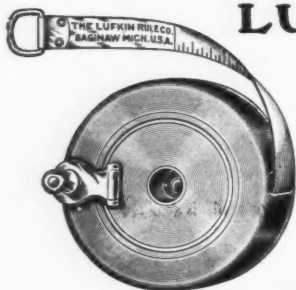
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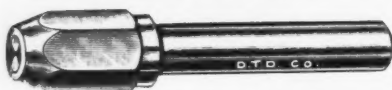
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J. J. McCabe, New York.
Metch & Merryweather Mch. Co., Cleveland, O.
Prentiss Tool & Supply Co., New York.
Toomey, Frank, Philadelphia.

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Athol Mch. Co., Athol, Mass.
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Davis, Frank M., & Co., Milwaukee, Wis.
Hammacher, Schlemmer & Co., New York.
Lutz Tool Mfg. Co., Springfield, O.
Montgomery & Co., New York.
Pratt & Whitney Co., Hartford, Conn.
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Standard Tool Co., Cleveland, O.
L. S. Starrett Co., Athol, Mass.
Syracuse Twist Drill Co., Syracuse, N. Y.
J. Wyke & Co., Boston, Mass.

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Baird Machinery Co., Pittsburg, Pa.
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Standard Tool Co., Cleveland, O.
Western Tool and Mfg. Co., Springfield, O.

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Phosphor Bronze Smelting Co., Philadelphia, Pa.

Metal Polish.

Hoffman, George W., Indianapolis, Ind.

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Becker-Brainard Milling Mch. Co., Hyde Park.
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Carter & Hakes Mch. Co., Winsted, Conn.
Cincinnati Milling Mch. Co., Cincinnati, O.
Cleveland Auto. Mch. Co., Cleveland, O.
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Fox Mch. Co., Grand Rapids, Mich.
Hendey Mch. Co., Torrington, Conn.
Ingersoll Milling Mch. Co., Rockford, Ill.
Kempsmith Mfg. Co., Milwaukee, Wis.
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Newton Mch. Tool Wks., Philadelphia, Pa.
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Sutton, C. E., Toledo, O.
Waltham Watch Tool Co., Springfield, Mass.
Whitney Mfg. Co., Hartford, Conn.

Milling Cutters.

Becker-Brainard Milling Mch. Co., Hyde Park.
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Brown & Sharpe Mfg. Co., Providence, R. I.
Holroyd & Co., Waterford, N. Y.
Kent, Edwin R., & Co., Chicago, Ill.
Morse Twist Drill & Mch. Co., New Bedford.
Pratt & Whitney Co., Hartford, Conn.
Relliance Mch. & Tool Co., Cleveland, O.
Standard Tool Co., Cleveland, O.
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Union Twist Drill Co., Athol, Mass.

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Steffey Mfg. Co., Philadelphia, Pa.

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Pratt & Whitney Co., Hartford, Conn.

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Arguto Oilless Bearing Co., Philadelphia, Pa.

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Dixon, Joseph, Crucible Co., Jersey City, N. J.

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New York Belting and Packing Co., New York.

Patterns, Wood and Metal.

Balkwill Pattern Wks., Cleveland, O.

Moline Tool Co., Moline, Ill.

Penn Pattern Wks., Chester, Pa.

For Alphabetical Index, see Page 20.

Classified Index to Advt's. (Continued).

Pattern Letters.

Butler, A. G., New York.

Patents.

Burnham, Royal E., Washington, D. C.
 Dunn & Turk, New York.
 Henry, F. G., Philadelphia, Pa.
 Howson & Howson, Philadelphia, Pa.
 Spear, Middleton, Donaldson & Spear, Wash-
 ington, D. C.
 Stevens, Milo B., & Co., Washington, D. C.
 Whittlesey, Geo. P., Washington, D. C.

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 Stoeber Fdry. & Mfg. Co., Myerstown, Pa.
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 Williams Tool Co., Erie Pa.

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Englehard, Chas., New York.

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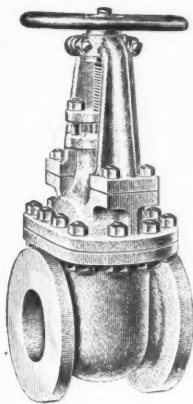
Reamers.

Cleveland Twist Drill Co., Cleveland, O.
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 John M. Rogers Boat, Gauge & Drill Works,
 Gloucester City, N. J.
 Schellenbach & Radcliffe, Cincinnati, O.
 Standard Tool Co., Cleveland, O.
 Three Rivers Tool Co., Three Rivers, Mich.
 Wiley & Russell Mfg. Co., Greenfield, Mass.

Reamers, Pneumatic.

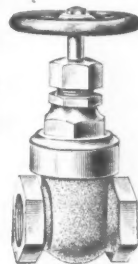
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For Alphabetical Index, see Page 20.

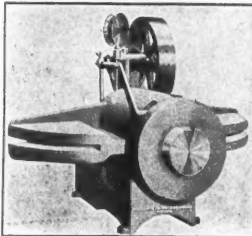


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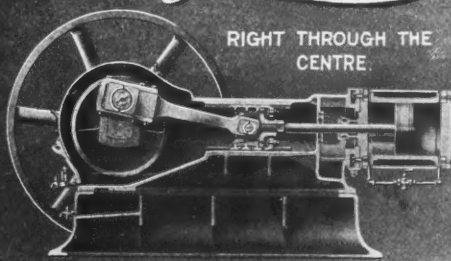
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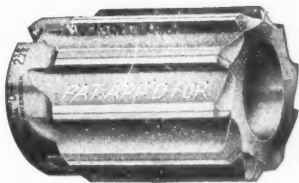


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Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
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Auburn Ball Bearing Co., Rochester, N. Y.
Ball Bearing Co., Philadelphia, Pa.
Bantam Anti-Friction Co., Bantam, Conn.
Standard Roller Bearing Co., Philadelphia, Pa.
- Saw Blades.**
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Goodell-Pratt Co., Greenfield, Mass.
Millers Falls Co., New York.
Montgomery & Co., New York.
West Haven Mfg. Co., New Haven, Conn.
- Saws.**
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Diamond Saw & Stamping Wks., Buffalo, N. Y.
Espin-Lucas Mch. Wks., Philadelphia, Pa.
Goodell-Pratt Co., Greenfield, Mass.
Millers Falls Co., New York.
H. T. Story, Chicago, Ill.
Tabor Mfg. Co., Philadelphia, Pa.
West Haven Mfg. Co., New Haven, Conn.
- Saws, Band.**
Fox Mch. Co., Grand Rapids, Mich.
- Schools.**
Pratt Institute, Brooklyn, N. Y.
The International Corr. School, Scranton, Pa.
- Screw Machines.**
Asa S. Cook Co., Hartford, Conn.
Jas. D. Mattison, New York.
National-Acme Mfg. Co., Cleveland, O.
Pratt & Whitney Co., Hartford, Conn.
Warner & Swasey Co., Cleveland, O.
- Screws, Hollow Set.**
Hammacher, Schlemmer & Co., New York.
- Separators, Oil.**
National Separator & Mch. Co., Concord, N. H.
- Shaft Hangers.**
Standard Pressed Steel Co., Philadelphia.
Wood's Sons, T. B., Chambersburg, Pa.
- Shapers.**
Cincinnati Shaper Co., Cincinnati, O.
Flather & Co., Nashua, N. H.
Mark Flather Planer Co., Nashua, N. H.
Fox Mch. Co., Grand Rapids, Mich.
Gould & Eberhardt, Newark, N. J.
Hendey Mch. Co., Torrington, Conn.
Kelly, R. A., Co., Xenia, O.
Morton Mfg. Co., Muskegon Heights, Mich.
New Haven Mfg. Co., New Haven, Conn.
Potter & Johnston Mch. Co., Pawtucket, R. I.
Pratt & Whitney Co., Hartford, Conn.
Smith & Mills, Cincinnati, O.
Springfield Mch. Tool Co., Springfield, O.
John Steptoe Shaper Co., Cincinnati, O.
Stockbridge Mch. Co., Worcester, Mass.
George D. Walcott & Son, Jackson, Mich.
- Shop Pans.**
Kilbourne & Jacobs Mfg. Co., Columbus, O.
- Slotting Machines.**
Betts Mch. Co., Wilmington, Del.
Dill, T. C., Mch. Co., Philadelphia, Pa.
New Haven Mfg. Co., New Haven, Conn.
- Special Machinery.**
Blanchard Mch. Co., Boston, Mass.
Waterbury-Farrel Fdry. & Mch. Co., Waterbury.
W. A. Wilson Mch. Co., Rochester, N. Y.
- Speed Changing Device.**
Evans, G. F., Newton Centre, Mass.
Reeves Pulley Co., Columbus, Ind.
- Stamping, Sheet Metal.**
Globe Mch. & Stamping Co., Cleveland, O.
- Stamps, Letters and Figures.**
Schwerdtle Stamp Co., Bridgeport, Conn.
- Steel.**
Frasse, P. A., & Co., New York.
Holroyd & Co., Waterford, N. Y.
Wm. Jessop & Sons, Ltd., New York.
Kent, Edwin R., & Co., Chicago, Ill.
Nash, Geo., & Co., New York.
Standard Pressed Steel Co., Philadelphia, Pa.
Wittman, A. P., & Co., Philadelphia, Pa.
- Steel Castings and Forgings.**
Birdsboro Steel Fdry. & Mch. Co., Birdsboro, Pa.
Hay-Budden Mfg. Co., Brooklyn, N. Y.
Wm. Jessop & Sons, Ltd., New York.
- Steel Rules.**
Brown & Sharpe Mfg. Co., Providence, R. I.
Keuffel & Esser Co., New York.
Lufkin Rule Co., Saginaw, Mich.
- Stoppers.**
McCullough-Dalzell Crucible Co., Pittsburg, Pa.
- Taps and Dies.**
C. H. Besly & Co., Chicago, Ill.
Butterfield & Co., Derby Line, Vt.
S. W. Card Mfg. Co., Mansfield, Mass.
J. M. Carpenter Tap & Die Co., Pawtucket, R. I.
Cleveland Twist Drill Co., Cleveland, O.
Eaton, Cole & Burnham Co., New York.
Geometric Tool Co., New Haven, Conn.
Wm. Jessop & Sons, Ltd., New York.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Hartford, Conn.
Reed Mfg. Co., Erie, Pa.
Reliance Mch. & Tool Co., Cleveland, O.
Standard Tool Co., Cleveland, O.
Toledo Mch. & Tool Co., Toledo, O.
Whitman & Barnes Mfg. Co., Chicago, Ill.
Wiley & Russell Mfg. Co., Greenfield, Mass.

For Alphabetical Index, see Page 20.

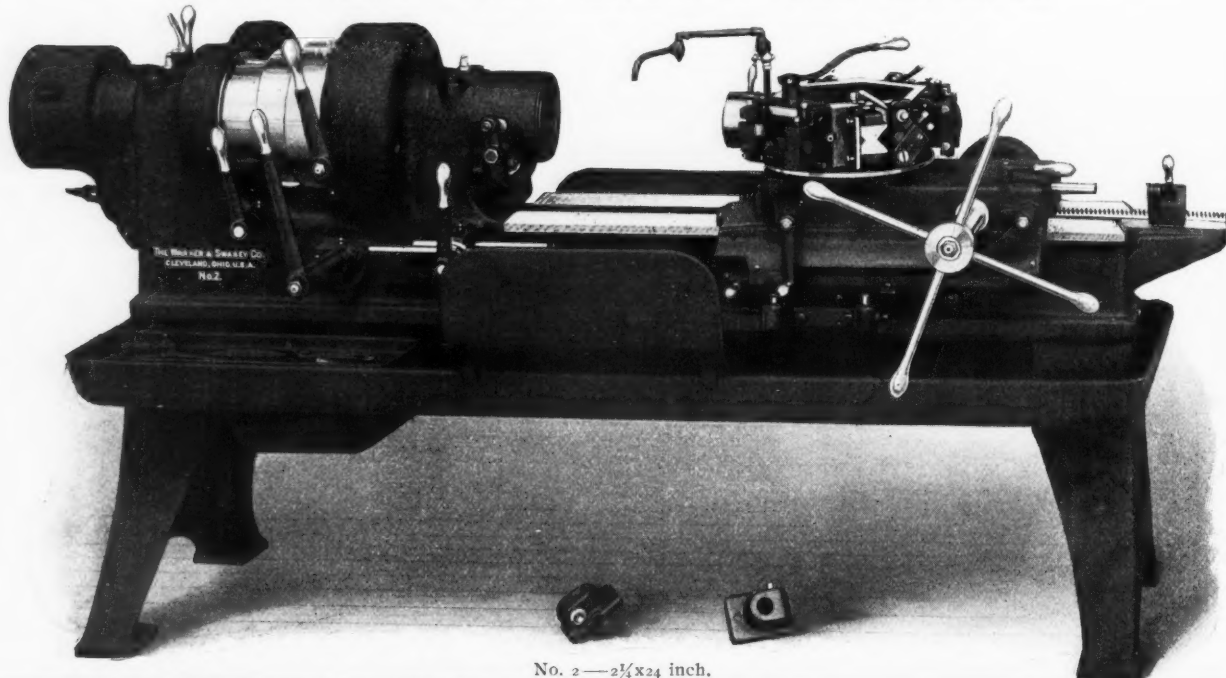
HOLLOW HEXAGON Turret Lathes have *every* modern facility for rapid—accurate—economical production—large or small lots.

THREE SIZES: $1\frac{3}{8}$ x 15, $2\frac{1}{2}$ x 24 and $3\frac{5}{8}$ x 36 inch.

Complete line of Turret Lathes, Screw Machines and Brass Working Tools.

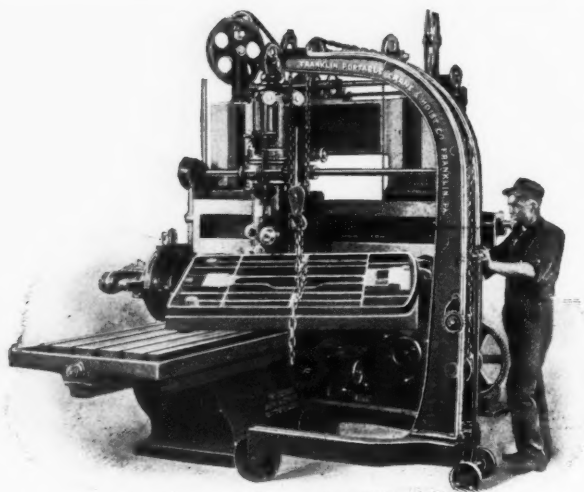
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FOREIGN AGENTS: Chas Churchill & Co., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Schuchardt & Schutte, Berlin, Vienna, St. Petersburg and Stockholm. Alfred H. Schutte, Cologne, Paris, Brussels and Milan. F. W. Horne, Yokohama. H. W. Petrie, Toronto. Williams & Wilson, Montreal.



No. 2— $2\frac{1}{4}$ x 24 inch.

Serving Machine Tools



Is one of the many uses to which a Franklin Portable Crane and Hoist can be put with advantage. Its lifting capacity—covering a range up to 4000 lbs—and its perfect portability make the transportation of a heavy casting, or other piece of work, from a remote part of the shop to and onto the machine for finishing, a short and simple matter. One man can manage the whole job, too, for the Franklin is first and last a one man machine.

The Franklin Portable Crane and Hoist is a perfect combination of strength and utility: compact, durable, adaptable, and a necessity for the busy shop.

*Ten Standard Sizes Carried in Stock.
Write for Booklet and New Prices.*

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STEEL BALLS BRASS BALLS BRONZE BALLS

"A" Grade Steel Balls for ordinary Ball Bearings

"B" Grade for Bicycles, etc.

"Hardware" Steel Balls for Hardware Specialties

USE THE BEST BALL MADE
"HIGH DUTY" STEEL BALLS
For high speed and heavy service

Our capacity is 500,000,000 balls per annum.

First prize for accuracy, strength and durability, at
Paris and Pan American Expositions.

Send for complete catalogue and Ball price list.

Standard Roller Bearing Co.
PHILADELPHIA, PA.

Largest Ball Makers in the world, also manufacturers of Ball Bearings,
Roller Bearings, Automobile Bearings, etc.

A Pattern Maker without a Fox Wood Trimmer within arm's reach

is only half the man he would be with one there.

A small bench machine should be devoted to every individual pattern maker's use. It will then be sharp and convenient, just as his planes and chisels are.

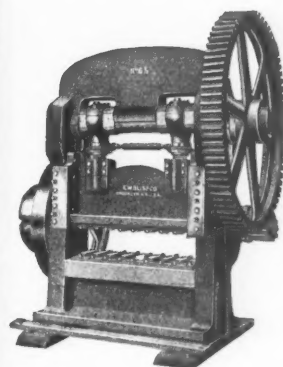
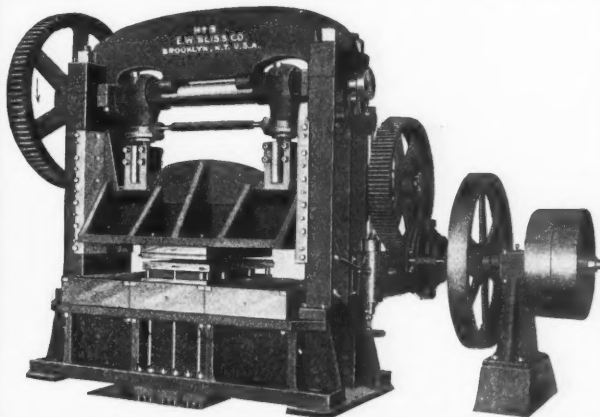
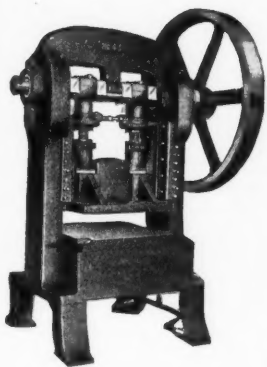
For this purpose, we have an **ideal tool**, small and light enough for convenient handling on the bench, yet large enough for the majority of small work and the **price is not prohibitive**.



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are unexcelled for light and heavy cutting, forming and forging. They are correctly proportioned and have heavy shafts and well gibbed slides. Quality of material and workmanship "the best"

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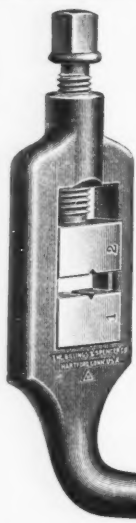
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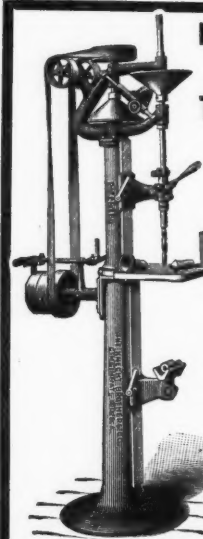


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Cut shows our new swivel clamp dog for holding taper pieces. It can also be used on straight pieces with the same good result.

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Examination
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of hard service

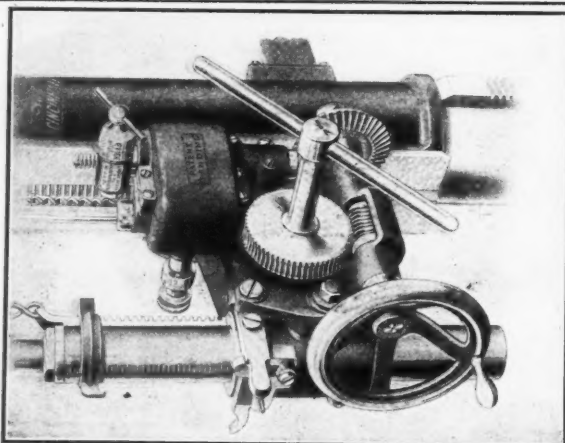
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are practically as
good as when new.
If this isn't proof of
good materials and
correct construction,
we don't know what
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is located the Entire Mechanism of the
Positive Geared Feed as furnished on

**THE
CINCINNATI**

Upright Drills.

Every operation instantaneous
guaranteeing wonderful results.

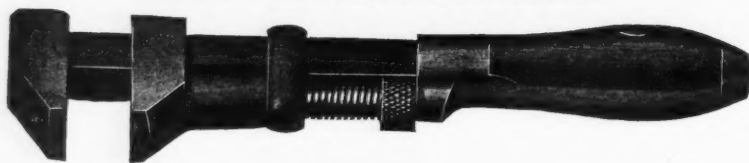
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Remember we are not copyists
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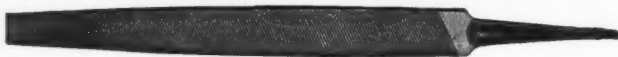
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Automatic and Special Machinery

of all kinds designed and built. Inventions
perfected. Builders of Variable Speed Iron
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ENGINEERS AND MACHINISTS.

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ROCHESTER, NEW YORK.

**THE WATERBURY
FARREL FOUNDRY and MACHINE CO.** Waterbury,
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DESIGNERS AND BUILDERS OF SPECIAL
MACHINERY DESCRIBED IN CATALOGS.

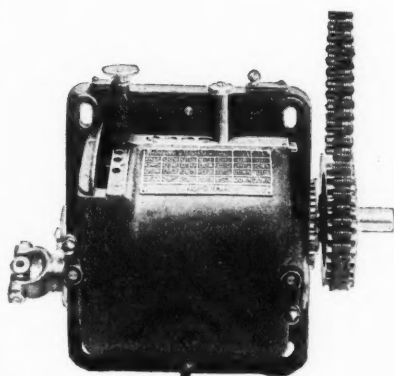
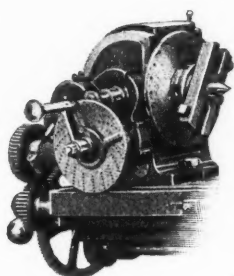
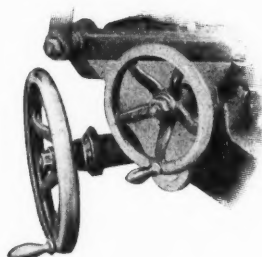
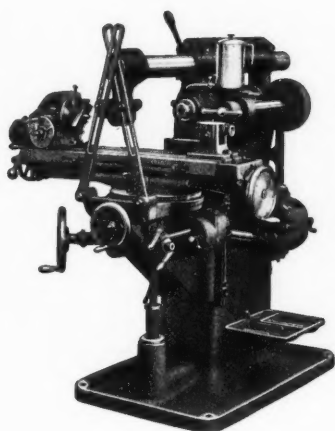
A=Automatic Rivet Machines.
B=Hinge and Butt Machines.
C=Cartridge Machines.
E=Drop, Screw and Foot Presses.
G=Tube and Rod Drawing Machinery.
H=Hydraulic Machinery.
L=Spinning Lathes, Edging Lathes, etc.
M=Open Back, Single Acting Power Presses.
N=Pillar Single Acting Power Presses.
P=Double Acting Power Presses.
R=Rolling Mills.
S=Shearers and Slitters.
T=Furnaces, etc.

Kent's Mechanical Engineer's
Pocket Book has reached its
seventh revised edition and forty
thousandth copy, a record al-
most as good as that of a modern
popular novel. Author and
publisher are to be congratulated.
—American Machinist, June 22,
1905.

JOHN WILEY & SONS, PUBLISHERS,
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BROWN & SHARPE MFG. CO.

PROVIDENCE, RHODE ISLAND, U. S. A.



8 Commercial Points "B. & S." Universal Milling Machines

All Talking Points are Working Points, each tested in our shops until proved to have a positive value.

- 1 All wearing surfaces and bearings proportioned to insure rigidity and maintenance of alignment.
Spindle bearings inside of frame—no overhang. Uprights supporting bearings, solid metal.
- 2 The overhanging arm is a solid steel bar simply and efficiently clamped at both bearings by one lever.
- 3 The Feed Tripping Mechanism is of the double plunger type and unusually sensitive.
- 4 Fixed Hand Wheels are provided for the cross and vertical feed shafts.
- 5 The Knee Screw is telescopic and does not extend below the base of the machine.
- 6 The Spiral Head is exceptionally rigid and fitted for either Plain or Differential Indexing.
- 7 The Table Feed Screw is not splined Drive from auxiliary shaft which carries clutch gears.
- 8 The Variable Feeding Mechanism is driven by chain direct from spindle to gear case, no intermediate gearing. Changes made by adjusting Index Slide and Levers.

Pamphlet giving detailed description mailed free to any address.

400 Milling Machines in operation throughout the plant. Our experience may be of service to you.

a recess provided to receive it, should this be desirable, as is frequently the case in applying it to small trolley hoist work, etc. Or it may be rotated within the case so as to permit it being placed in any desired position, as on the sides or top of crane cab. It may also be arranged for rope operation from the floor, in which case a centering spring is provided. Types B and C may be provided with bell crank and link to permit of installation at the back of the cab and operation by levers from the front. Resistance is provided which will give a speed reduction of 50 per cent under the average load conditions on the crane. All contacts are of hard-drawn copper, and may be readily renewed from the front of the controller without disturbing any connections at the rear. All brushes are of drop-forged copper, easily renewable and interchangeable, and are so shaped as to ride over the contacts and give a good working contact even when the contacts have become considerably roughened. A large number of contacts is used, providing for gradual speed changes, and practically eliminating all sparking between segments. The controllers are designed to occupy the minimum space consistent with the duty they are required to perform, and their arrangement is such that the operator's view is practically unobstructed. Arrangements for slow speed control may be obtained in types B and C. This feature has not been fully developed as yet, but bulletins will shortly be issued covering same.

MISCELLANEOUS TOOLS AND APPLIANCES.

Keuffel & Esser, 127 Fulton St., New York, have brought out a tool which they call the "Paragon Drafting Instrument." It is made of German silver, and is intended to combine the functions of the scales, triangles, protractor, etc., with which the draftsman's board is generally covered. It is mounted and slides on the T-square or straight-edge.

A chain hoist made on the differential gear principle is being manufactured by the Franklin-Moore Company, Winsted, Conn. The mechanism of this hoist is so arranged that by throwing a pawl out from a ratchet wheel, the hook may be given a rapid movement, such as is needed in bringing it down to the work or in taking up slack in the chain. Otherwise, the hoist is operated in the usual manner.

The Reeves variable-speed drive has lately been improved in one or two particulars. The thrust for the hub of the disks is now made in the form of a roller bearing, the rollers being very short and set in pockets in a split brass cage in alternate groups of two and three, so that the wear may be evenly distributed over the face of the collars. On the larger sizes, the disks, instead of being driven by a key in the shaft as formerly, slide in and out on three ground steel pins, mounted on a collar between them. The motion is thus transferred from the shaft to the disks by these pins. This drive is built by the Reeves Pulley Co., Columbus, Ind.

* * *

A coiled-spring friction clutch is manufactured by the Double Friction Coil Clutch Co., Chicago, Ill. The advantages claimed for the clutch are small space occupied and an extremely powerful drive, together with a gradual application of the driving force when the clutch is put into operation. This latter is the distinctive feature of the clutch which makes it essentially different from other friction-coil clutches. The clutch operates by coiling a spiral spring tightly about an inner drum. There is an auxiliary friction arrangement, however, consisting of a disc on the periphery of which is a lug that comes in contact with a pin projecting from the end of the coil spring. When the clutch is disconnected this disc turns freely on the shaft and offers no resistance tending to coil the spring; but when the clutch mechanism is thrown in this disc is held by frictional contact between two surfaces which are brought together with a greater or less degree of force, according to the way in which the clutch is adjusted. This disc, therefore, gradually tightens the coil on its drum instead of acting suddenly, as would be the case if positive contact were made with the coil instead of using the intermittent friction arrangement.

FRESH FROM THE PRESS.

HENDRICKS' COMMERCIAL REGISTER OF THE UNITED STATES. Published by the S. E. Hendricks Co., 76 Elm Street, New York City. 1,275 pages, price \$7.00.

This is the fourteenth annual edition of the well-known business directory published by this company. It contains over 350,000 names, addresses and business classifications, with lists of manufacturers and dealers, chiefly in the architectural, mechanical, engineering, contracting, electrical, railroad, iron, steel, mining, mill, and quarrying industries. The directory is carefully revised each year and brought up to date as completely as possible.

THE TEXTILE WORLD OFFICIAL DIRECTORY OF THE TEXTILE INDUSTRIES OF THE UNITED STATES AND CANADA. Published by the Lord & Nagle Co., 299 Devonshire Street, Boston, Mass. Price \$2.00. 462 pages with 22 maps, showing location of towns having textile industries.

The directory is divided into five parts, consisting of textile manufacturers, yarn trade industries, commission and order mills and dealers in raw material and agents and buyers. This new edition contains the names of 624 textile establishments which did not appear last year. The immensity of the textile industries is shown by the summary of machinery statistics, from which we learn that there are 25,500,000 cotton spindles in this country and Canada; over 580,000 cotton looms, 88,000 woolen looms, 68,000 silk looms, and 100,000 knitting machines.

AN INVESTIGATION OF ROTATIONS PRODUCED BY CURRENTS FROM A SINGLE-PHASE ALTERNATOR, by Arthur Curtis Scott. Published by the University of Wisconsin, Madison, Wis., being Bulletin No. 102. 162 pages 6 1/2 x 9 1/4 inches, illustrated by 96 cuts. Price 50 cents.

This valuable pamphlet is a thesis submitted for degree of Ph.D., University of Wisconsin, 1902. The author endeavors to give a comprehensive history and survey of the development of the single-phase alternator. The chronology begins Christmas Day, 1821, which date marks the primary production of magnetic rotation by Michael Faraday, who then first obtained the revolution of the magnet around an electric current. The author says in his prefatory note that the subject of electric engineering has received most extraordinary attention during the last decade and particularly in this true with respect to the branch of alternating currents. But discoveries and investigations have followed one another so rapidly that little attention has been given to the history of development. The pamphlet under review appears to be a very conscientious effort to present the correlation of experimental data and theories concerning the development of single-phased rotations. It is one that any advanced electrician should be able to read with profit.

A particularly attractive feature of the *Century* for August is a complete story by Rudyard Kipling entitled "An Habitation Enforced." This is written in the great story-teller's happiest vein, and is all the more welcome in that it is the first work from Mr. Kipling's pen to appear in any American magazine for nearly a year. The seasonable sports, rowing and automobilism, are exploited in Ralph D. Paine's "The Spirit of School and College Sport," and "Alpine Climbing in Automobiles," by Sterling Hellig; both these articles breathe that charm which can only be gained by personal interest and experience. The concluding chapter of Mr. Gibson's "The Associated Press" series and a second installment of "The Electric Railway" appear in this number, together with the usual timely sketches, fiction and verse, and the issue is further enriched by color drawings by Ivanowski and Howard Chandler Christy.

NEW TRADE LITERATURE.

E. W. Bliss Co., Brooklyn, N. Y., describing the minting machinery made by this company. There are many handsome illustrations.

Akron Belting Co., Akron, Ohio. Catalogue of leather, rubber and cotton belting, belt dressing, oil filters, hose and general supplies.

Oswego Tool Co., Oswego, N. Y. Illustrated price list of wrenches, tube expanders, lathe dogs, vices, pipe cutting tools, punches, ratchets, etc.

Browning Engineering Co., Cleveland, Ohio. Bulletin No. 19 of the Browning locomotive cranes, which are made in a great variety of styles and sizes for handling all kinds of material.

Klinsinger-Ison Co., Cincinnati, Ohio. Illustrated circular of the Sterling friction clutch explaining its construction and containing price list of the different sizes.

American Blower Co., Detroit, Mich. Catalogue No. 180 of exhaust fans. This illustrates the various styles and applications of the A. B. C. series of blowers and fans made by this company.

Electro Dynamic Co., Bayonne, N. J. Circular No. 14 describing the interpole variable speed motor with diagrams showing efficiency and speed curves, dimensions of motors, etc.

The Bethlehem Steel Co. are at work on three crank shafts which will weigh when finished 86,600 pounds each. They are turned out of solid steel ignots and are intended for three Snow gas engines.

At the last annual meeting of the Woodward & Powell Planer Co., E. M. Woodward was elected president and treasurer, A. M. Powell, vice-president and superintendent, and J. W. Robinson secretary.

Chicago Flexible Shaft Co., Chicago, Ill. A new catalogue, describing their full line of gas furnaces, flexible shafts, etc., is now ready for distribution.

Ellis W. Morse & Co., 112 Court Street, Binghamton, N. Y., have recently moved into their new five-story block at 81 State Street. The building is well equipped, each floor being occupied by a special department.

The Dayton Hydraulic Machinery Co., R. E. Spencer Geare, sales manager, have opened a New York branch office at 133 Liberty Street. They will carry a line of Brooks' centrifugal pumps, of which they are exclusive manufacturers.

Mr. Harry V. Croll, M. E., for the past eight years with the E. P. Allis Company, and their successors, Allis-Chalmers Co., of Chicago, has resigned and accepted a position with the Wellman-Seaver-Morgan Co., Cleveland, O.

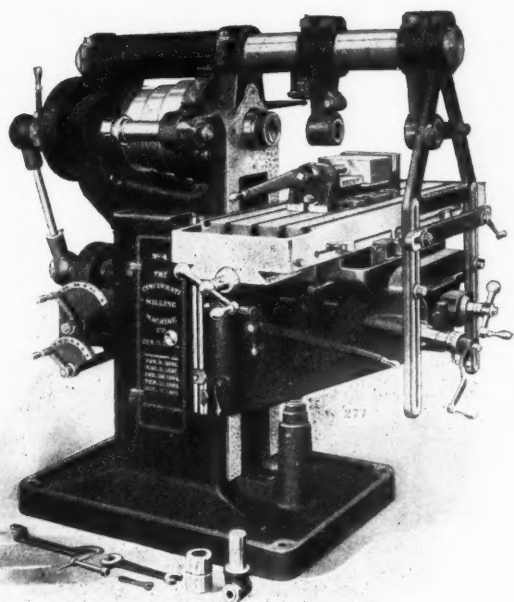
Link-Belt Engineering Co., Philadelphia, Pa. Catalogue devoted to the Renold roller chain, which explains the advantages of this chain for power transmission and shows how to shorten or increase the length of the chain by removing or adding links.

Lutz Tool Mfg. Co., Springfield, Ohio. Catalogue of surfacing tools consisting of file handles of different designs and a variety of scrapers and scraper holders. These scrapers are made with inserted blades, fixed or adjustable, as desired.

Diamond Saw and Stamping Works, Buffalo, N. Y. Catalogue of Sterling hack saw blades and frames, which are made in various styles and sizes by this company for the different classes of work upon which hack saws can be advantageously employed.

Newton Machine Tool Works, Philadelphia, Pa. Catalogue No. 41 of rotary planing machines. These are made in sizes from 26 inches up to 96 inches diameter of cutter head and with vertical, horizontal and duplex spindles; also of special construction for different classes of work.

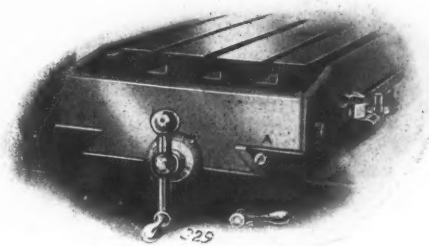
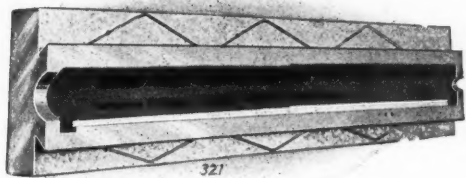
The Wellman-Seaver-Morgan Co., Cleveland, O., have appointed Mr. W. A. Stadelman, formerly Eastern agent of their company, general sales agent, with headquarters at Cleveland, O. They have also appointed Mr. Fred Stadelman assistant manager of the New York office, No. 42 Broadway.



Capacity To Do Work

does not depend alone upon the spindle and feed power of a miller, because these can't do more than the table and its bearings will stand, and no matter how accurate it is when new, it won't stay in alignment long unless the bearings are large and well protected.

The illustrations show how the table of the new "Cincinnati" Miller is made.



It has great depth—won't spring and bind the bearings when work is clamped to it.

It is stoutly webbed on the inside—giving it great rigidity.

It has wide bearings—placed at the top of the V-part at the point marked "A" and as wide as the table itself.

Ample oiling facilities—through front side of table. Inside works and bearings may be oiled without removing work.

These features, in connection with the new double back gears and new knee, put the Cincinnati farther in the lead than ever in the matter of rapid and accurate production. Ask for further details.

WE ARE MILLING SPECIALISTS

The Cincinnati Milling Machine Company,
CINCINNATI, OHIO, U. S. A.

European Agents—Schuchardt & Schutte, Berlin, Vienna, St. Petersburg, Stockholm. Alfred H. Schutte, Cologne, Brussels, Liege, Milan, Paris and Bilbao. Chas. Churchill & Co., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Niles-Bement-Pond Co., 23 Victoria St., London, S. W. *Canadian Agents*—Williams & Wilson, Montreal. H. W. Petrie, Toronto.

Hilsey-Wolf Co., Cincinnati, Ohio. Illustrated catalogue of portable, electrical tools, consisting of self-contained portable grinders and drills, adapted to be mounted at the place where the work is to be done, the former being suitable for use on the lathe, milling machine or planer. This company has also brought out a series of tools adapted for the alternating current.

Northern Engineering Works, Detroit, Mich. Catalogue No. 20 of cranes. Many standard and special designs of traveling cranes are illustrated in this catalogue showing locations where they have been installed, and there are also listed a variety of trolley hoists, pneumatic hoists, pillar, job, locomotive and other types of cranes. The catalogue contains over one hundred half-tone illustrations.

Otto Gas Engine Works, Thirty-third and Walnut Streets, Philadelphia, Pa., have issued an attractive booklet entitled, "Some Reasons Why." The nature of the contents can be guessed from the title, but the attractiveness of the booklet can only be appreciated by looking through its pages. It is an exceedingly neat presentation of the claims of the Otto engine.

Chicago Flexible Shaft Co., LaSalle Avenue and Ontario Street, Chicago, Ill. Illustrated catalogue of Stewart's gas blast furnace and flexible shafts. It describes a few of the purposes for which these furnaces are adapted, pointing out the advantages of a uniform heat treatment for steel. The flexible shafts and various tools made by this company to be operated by this form of transmission are also described.

MANUFACTURERS' NOTES.

Hill-Standard Mfg. Co., Anderson, Ind., manufacturers of tool holders, dogs and machine vises, are now located in their new factory which is in complete running operation.

The Union Twist Drill Co., Athol, Mass., announce that Mr. Walter A. Darling, formerly connected with the cutter department of the Brown & Sharpe Mfg. Co., has accepted the position of manager of their New York store.

G. D. Michell, formerly of the United Shoe Machinery Co. and for a long time with the Jones & Lamson Machine Co., has now become associated with the Warner & Swasey Co. of Cleveland, Ohio, in the capacity of Western representative.

The S. Obermayer Co., manufacturers of foundry facings and supplies, of Cincinnati, O., have opened an office at 120 Liberty Street, New York. Mr. Edgar G. Seeman, who has represented the company at Pittsburg for many years past, has charge of the New York office.

United States Electric Tool Co., William A. McCallum, President, Cincinnati, Ohio, have recently removed to a new factory at Eighth St. Vladuct and C. H. & D. Ry., where they have improved facilities and ample room to meet the increasing requirements of their business.

The business of the Royersford Foundry and Machine Co., Royersford, Pa., is constantly increasing. The works in all the departments are running full and the sales of Royersford punch and shearing machines so far this season has been larger than ever before in the history of their manufacturing.

The Whitcomb-Blaisdell Machine Tool Co. has been formed by the union of the Whitcomb Mfg. Co., the P. Blaisdell & Co. and the Whitcomb Foundry Co. Their main offices are located at 134 Gold Street, Worcester, Mass. The business will be conducted along the same lines as were heretofore followed by the individual firms.

Mr. W. E. Farrell, for many years manager of the Birdsboro Steel Foundry and Machine Co., has severed his connection with that company to accept the vice-presidency of M. H. Treadwell & Co., Myerstown and Lebanon, Pa. Mr. Farrell will be located at Lebanon, having entire charge of the plant at that place.

The Eaton, Cole & Burnham Co., Bridgeport, Conn., have recently erected two enormous signs over their plants, one of which is over 1,100 feet long, and another which is on a large water tank 130 feet in the air. These signs are so unusual in size and so conspicuously located as to quite generally attract the attention of travelers between Boston and New York.

Wilcox Mfg. Co., Aurora, Ill., have increased their capacity in the overhead trolley track department and installed heavier machinery for the manufacture of all types of cranes. Mr. C. F. Blake, who is a well-known mechanical engineer, having devoted many years to hoisting machinery, and who is also a frequent contributor to MACHINERY, has been placed in charge of the new department. The Wilcox Co. is now in a position to make bids on hoisting equipment of every kind.

The Crocker-Wheeler Co., Ampere, N. J., have held their annual election of officers for the ensuing year. They are as follows: President, Schuyler Skaats Wheeler; vice-president and chief engineer, Gano S. Dunn; treasurer, W. L. Brownell; assistant treasurer, G. W. Bower; directors, Prof. Francis B. Crocker of Columbia University, Dr. Wheeler, Messrs. Dunn and Doremus, A. Foster Higgins, Herbert Noble, Thomas Ewing, Jr., F. L. Eldridge and C. A. Spofford. The regular quarterly dividend of 1½ per cent. has been declared and the affairs of the company are in a flourishing condition.

MISCELLANEOUS.

Advertisements in this column, 25 cents a line, ten words to a line. The money should be sent with the order. Answers addressed to our care will be forwarded. Original letters of recommendation should not be enclosed to unknown correspondents.

A MACHINIST WANTED in every shop to sell my Calipers and Levels. Liberal proposition. Address E. G. SMITH, Columbia, Pa.

A NEW BOOK—Unpatented mechanical movements, transmissions, differentials, carbureters, mufflers, etc., used in the make-up of gasoline engines and motor carriages; including complete engines and vehicles, with 28 sheets of blue prints showing details and dimensions. Sold by S. M. HOWELL, Steubenville, Ohio.

BUSINESS OPPORTUNITY.—Partner wanted with \$35,000 to \$40,000 to purchase half interest in established up-to-date machine shop and foundry, controlling and manufacturing patented special machinery. Good opportunity for office or mechanical man. Address P. O. Box 1456, St. Louis, Mo.

"DIES AND DIE MAKING."—A practical book, \$1.00. Send for index sheet. J. L. LUCAS, Bridgeport, Conn.

DRAFTSMEN WANTED.—One experienced in hydraulic and steam hammers; state age, experience and some idea as to salary expected. Address Room 9, 524 Walnut Street, Philadelphia, Pa.

DRAFTSMEN AND MACHINISTS.—I can obtain good patents for inventions, if you will follow my advice; 20 years' practice; registered; low charges; highest references. EDWIN GUTHRIE, Corcoran Building, Washington, D. C.

ELECTRICAL OR MECHANICAL ENGINEER.—To act as assistant in service and maintenance department of large factory near New York. Excellent opportunity for bright man who is not afraid of work. Salary moderate to start. Give experience, age, and salary expected. Address BOX 10, care MACHINERY, 66 West Broadway, New York.

FOR SALE.—A paying machine repair and blacksmith shop without opposition; in a good Kentucky town. Address C. & O. SCHAEFER, Frankfort, Ky.

FOR SALE.—Back numbers MACHINERY, Vol. 1, No. 3, to date, with few exceptions. Make offer. All in first-class condition. Address "T. E. B." 2531 Ontario Street, Chicago, Ill.

FOR SALE.—First-class foundry and machine shop, located in southwestern Idaho; three railroads; center of large mining district; center of zone in which over a million dollars will be expended by U. S. Reclamation Department; ideal climate; rapidly growing business. Address "FOUNDRY," care MACHINERY, 66 West Broadway, New York.

OUR REPUTATION for supplying the best technical men is so high that we can't afford to list an incompetent man. If your ability and experience place you in the high grade class we can help you to a good position. Write us to-day stating position and salary desired. Offices in 12 cities. HAPGOODS, suite 511, 309 Broadway, N. Y.

PATENTS.—Send for "The Value in a Patent." SPEAR, MIDDLETON, DONALDSON & SPEAR, 1003 F Street, Washington, D. C.

PATTERNS AND MODELS are what we make; let us estimate on yours; work and prices will please you. E. S. MUMMERT CO., Hanover, Pa.

PATENTS.—H. W. T. Jenner, patent attorney and mechanical expert, 608 F Street, Washington, D. C. Established 1883. I make an examination free of charge and report if a patent can be had and exactly how much it will cost. Send for a circular. Member of Patent Law Association.

PATENTS PROMPTLY SECURED.—Highest references from prominent manufacturers. Report as to patentability free. Inventors' Hand Book sent upon request. SHEPHERD & PARKER, 200 Dietz Building, Washington, D. C.

SUPERINTENDENT WANTED.—Thoroughly competent to take charge of modern machine shop employing 300 hands on small interchangeable work of an unusually accurate and expensive character. In replying, state salary expected, age and experience and give references, as no applicant will be considered whose record does not prove him to be of the highest grade. Attractive position and good prospect for the right man. All correspondence will be considered confidential and returned to applicant if desired. Address Box 12, Mass., care MACHINERY, 66 W. Broadway, New York.

WANTED.—Established mercantile, manufacturing or milling business. Will pay cash. Give full particulars and lowest cash price. Address Box 5, care MACHINERY, 66 W. Broadway, New York.

WANTED TO MANUFACTURE.—Some tool, machine, or metal article. Will buy desirable business, patent or idea. Address "CORN," care of MACHINERY, 66 W. Broadway, New York.

WANTED.—Machinery salesmen, engineers, draftsmen, foreman, superintendents for good positions. Write for terms. CLEVELAND ENGINEERING AGENCY, Rose Building, Cleveland, Ohio.

WANTED.—Agents, machinists, tool makers, increase your salary. Sell Saunders' enlarged Hand Book for Practical Mechanics. A pocket-manual guaranteed to fill the bill as a ready reference and to contain more rules, shop kinks, than all the other mechanical books bound together in one volume. Secrets, from note books of best mechanics in the country, will figure out by simple arithmetic problems you run up against every day in the shop. Price, postpaid, \$1.00 in cloth, \$1.25 in leather with flap. Agents make big profits. Send for list of books. E. H. SAUNDERS, 216 Purchase Street, Boston, Mass.

WANTED.—In Northern Ohio, a first-class general foreman for machine shop manufacturing small parts; must be able to get work out quickly and handle men successfully. Address ROYAL MOTOR CAR CO., Cleveland, Ohio.

WANTED.—In Northern Ohio, an assistant superintendent for machine shop manufacturing automobiles. Address ROYAL MOTOR CAR CO., Cleveland, Ohio.

WANTED.—Position as assistant superintendent or foreman of machine shop; several years successful experience in large shop in charge of casting, grinding, punching and other departments; good knowledge of card index systems for keeping track of stock, patterns, etc. Address "W," care MACHINERY, 66 West Broadway, New York.

WANTED.—Superintendent for factory in a western city, employing three to five hundred men, where high-speed machines are produced and accuracy is essential. Man with large shop experience. In answering state present occupation and past experience. Address Box 11, care MACHINERY 66 West Broadway, New York.

TREASURER WANTED.—Treasurer (aged 75) will retire actively from prominent engine manufacturing company. Will sell successor half his stock for \$50,000, which earns and has earned for fifty years, over 18 per cent dividends. Salary \$4,000. Net solid assets \$400,000. Rating \$500,000. A1. Very small liabilities. Book value of stock \$200. Address S. HENRY, 1 Union Square, New York.

WANTED.—Cold saw for I Beams, up to 18 inches. Good second-hand machine, or inexpensive new machine. Address UNITED IRON WORKS CO., Springfield, Mo.

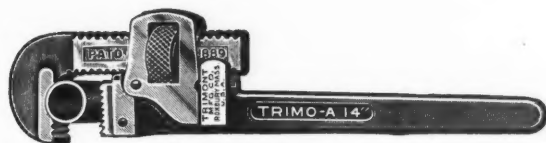
WANTED.—Machinist with experience as foreman of finishing shop in large bolt plant wants position. Address "ADVANCEMENT," care MACHINERY, 66 West Broadway, New York.

WANTED.—Position as salesman for concerns making or dealing in machinery or shop supplies. Ten years successful tool-room experience; special knowledge of grinding machines. Address "R," care MACHINERY, 66 West Broadway, New York.

WILL MANUFACTURE AND PLACE ON THE MARKET any machine or device. Machinery, etc., to be designed or developed will receive my prompt and careful consideration. Let us figure on your work. EDWARD LINDMUELLER, Williamson Bldg., Cleveland, O.

\$5.00 less 15 per cent, buys a 3-inch and 6-inch tubular micrometer frame. A. J. MACHEK, Milwaukee, Wis.

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It will do the work, under any and all conditions. It stands pre-eminently as one of the two best pipe wrenches made.

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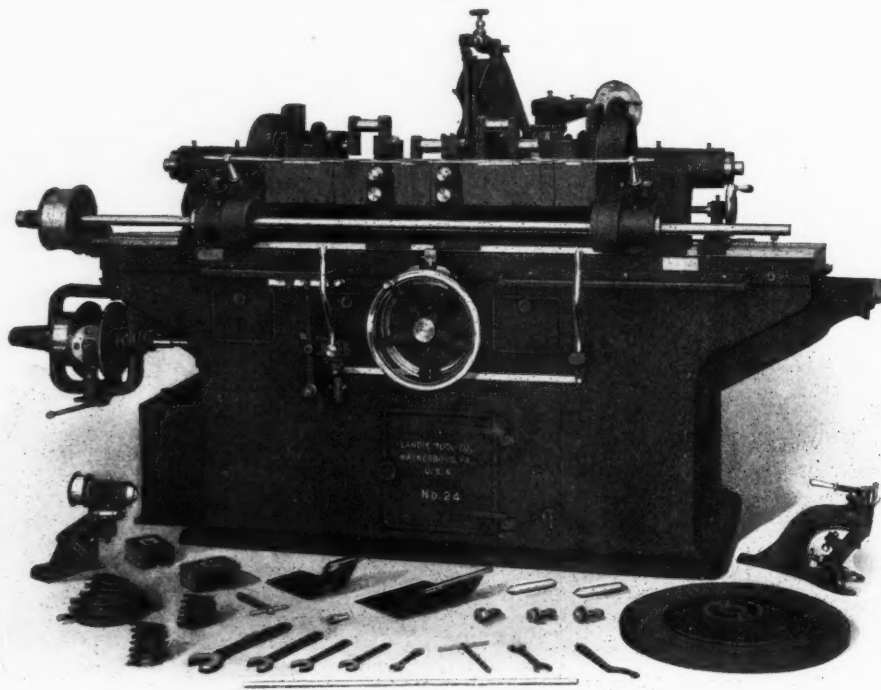
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Accurate and Rapid Crank Shaft Grinding



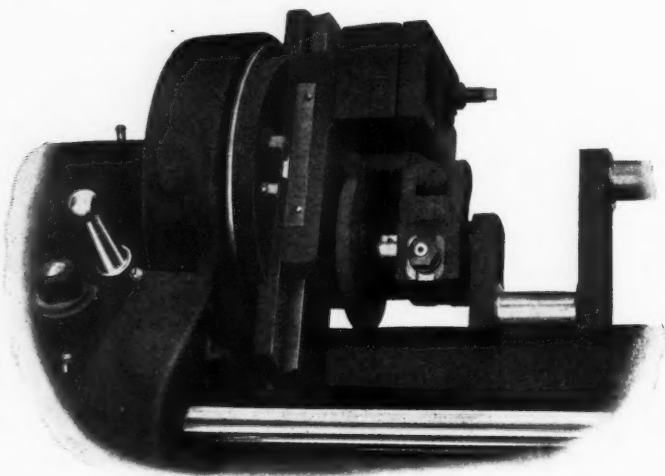
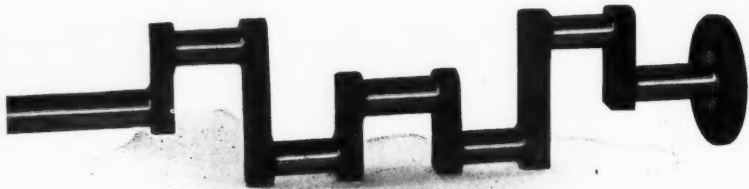
Nos. 23 and 24 Crank Grinding Machines

The new Landis Crank Grinding Machines with automatic feeds, adjustable heads for holding and carrying work, and specialemy wheel truing device will grind single and multiple crank shafts, with throws up to 12" single and 6" multiple, in less time and with a greater degree of accuracy than could be obtained by any other method. The usual difficulties in securing absolutely cylindrical wrists

and journals are overcome by the grinding process and the most satisfactory results assured.

Crank-shaft finished on this machine. Time: 1 1/4 hours.

Parts ground:—Four wrists 1 1/2" diameter, 3" long; three journals, 1 3/4" diameter, 3", 4" and 6" long respectively; metal removed 1-32".



Adjustable Head attached to face plate for carrying work when grinding wrists

Compare this time with that of former methods.

These new machines have all the usual "Landis" advantages in addition to their special features, are capable of producing the highest grade of work economically, and will stand severest service.

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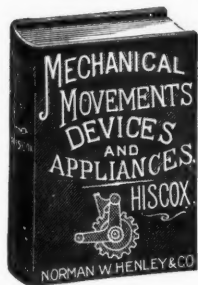
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Mechanical Movements, Powers and Devices

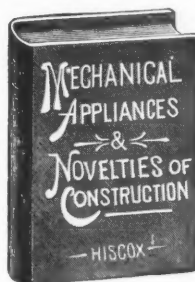
A practical treatise on Mechanical Movements, being a dictionary of appliances, devices and contrivances used in mechanical work, with details and construction of machinery for every purpose. Fully illustrating the leading devices for the transmission of power and its measurement. Generators and transmitters of steam power, steam appliances, gas motors and valve gears of steam and gas engines. Hydraulic devices, etc. Atmospheric power and motor devices, blowers, air compressors and water lifts. Pneumatic tools. The principles of construction in electric appliances for power, lighting, heating, and welding. Horseless vehicles, tricycle and bicycle movements. Planetary gear. Ratchet motions. Cranes, cranks and eccentric motions, universal joints of many designs. Clock and watch movements and devices. Mining, hoisting and conveying devices. Separating dredging devices. Shop and factory appliances, tools, standard screw threads. Mills and mill appliances; roofs, bridges, railway devices, locomotives. Acetylene generators. Arms and ordnance, etc., with 1800 specially made engravings. Tenth Edition. 400 octavo pages.



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This is a supplementary volume to the one upon mechanical movements by the same author. Unlike the first volume which is more elementary in character, this volume contains illustrations and descriptions of many combinations of motions and of mechanical devices and appliances found in different lines of machinery. The illustrations in this volume are of more complex machinery, are larger, with more extended descriptions. Some of the chapters included are Steam Appliances; Hydraulic Power Appliances; Road and Vehicle Devices; Horological Time Devices; Textile and Manufacturing Devices, etc. Indexing, also, a special illustrated chapter showing what has been done along the line of Perpetual Motion; each device being shown by an engraving with a description showing its working parts and the method of operation. Containing 396 pages. 1000 specially made engravings.



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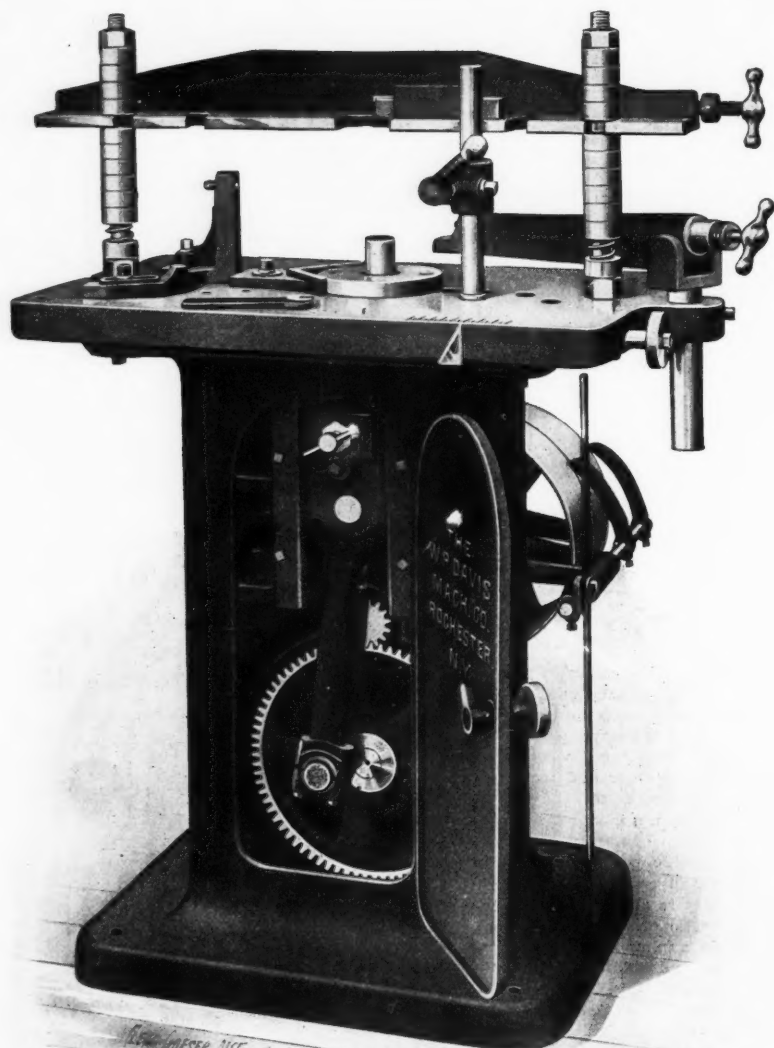
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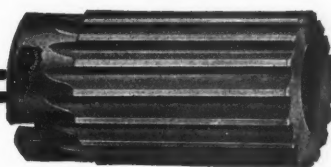
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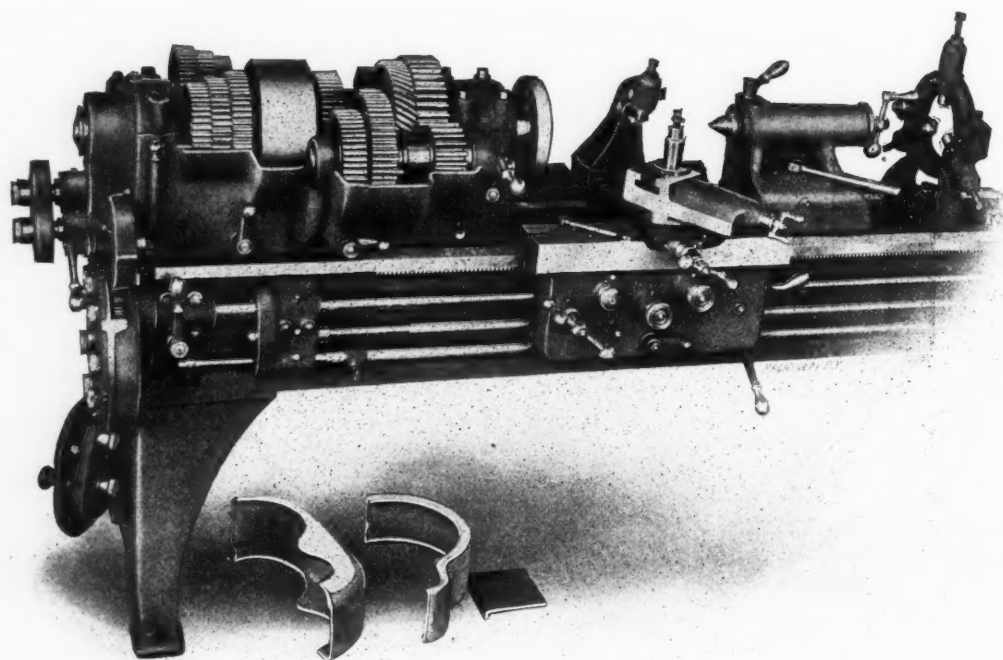
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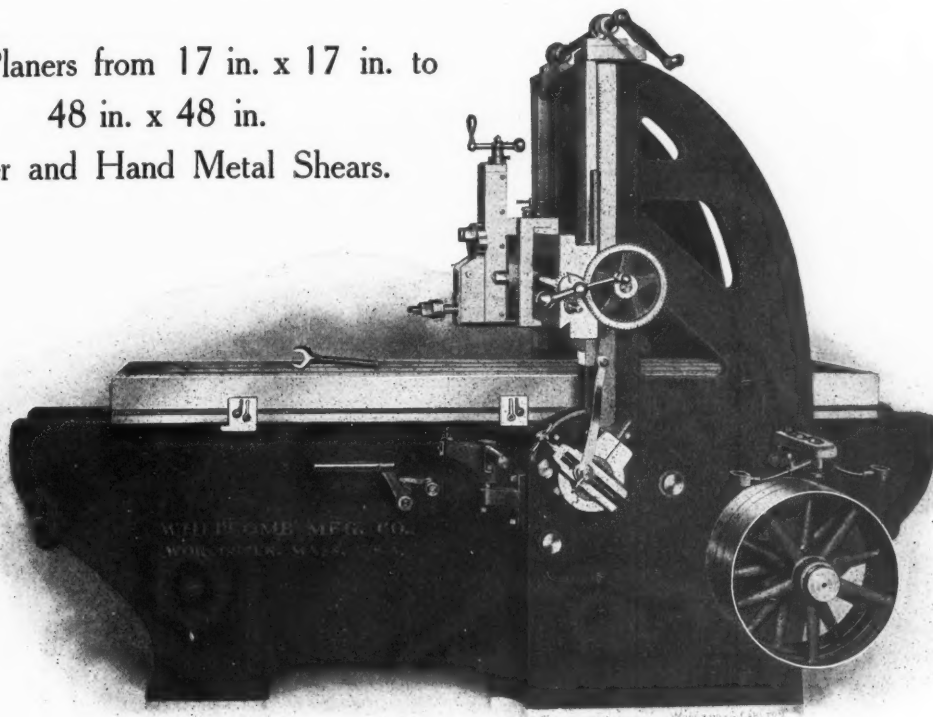
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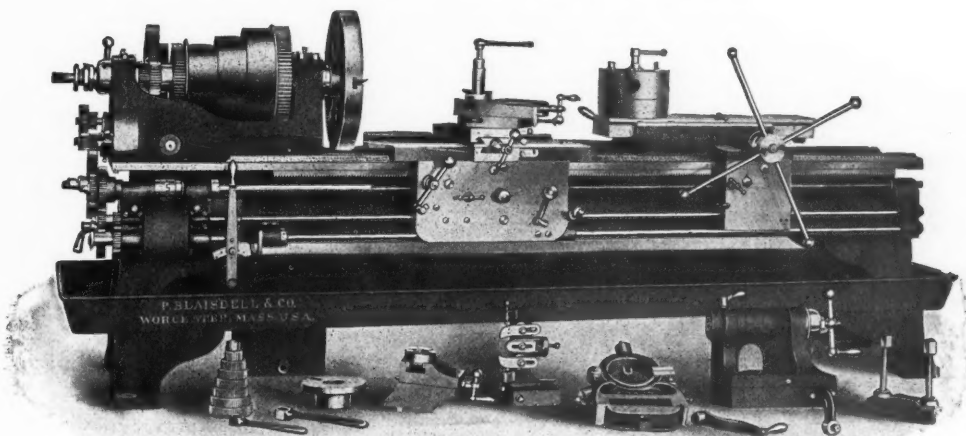
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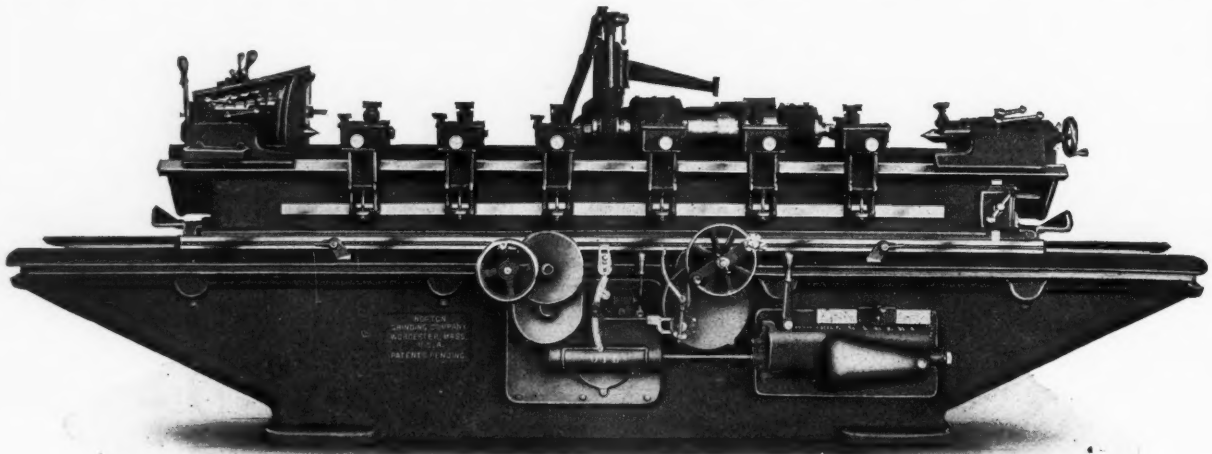
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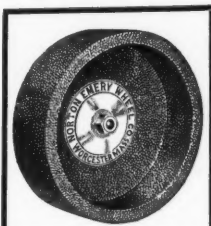
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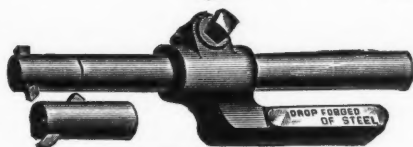
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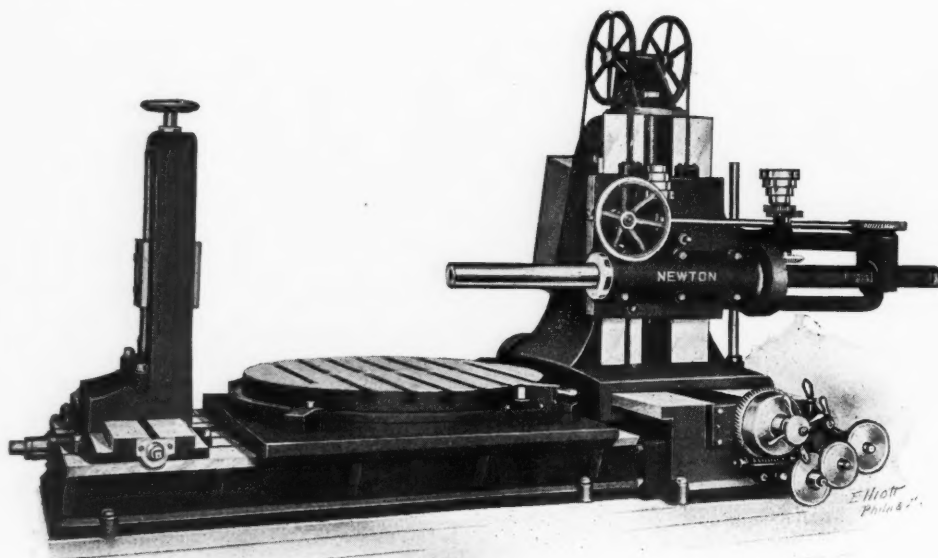
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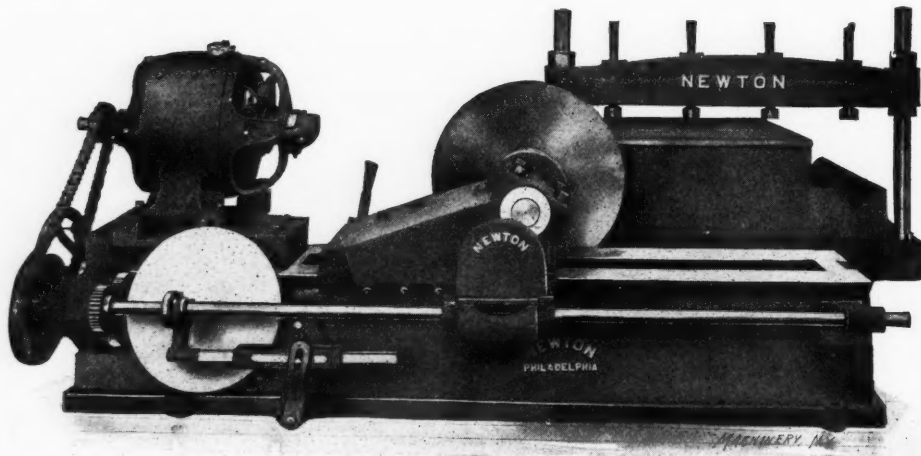
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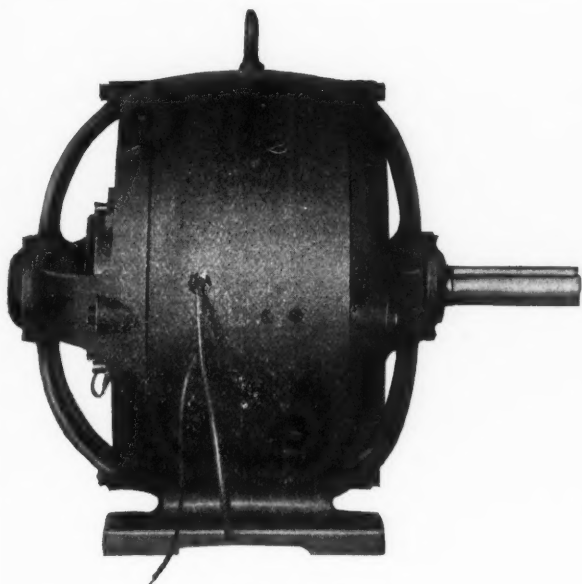


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Where variable speed and high starting torque are required, the **INTERPOLE Variable Speed Motor** is supreme.

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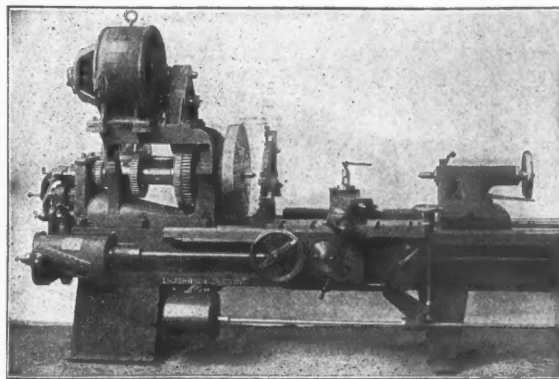
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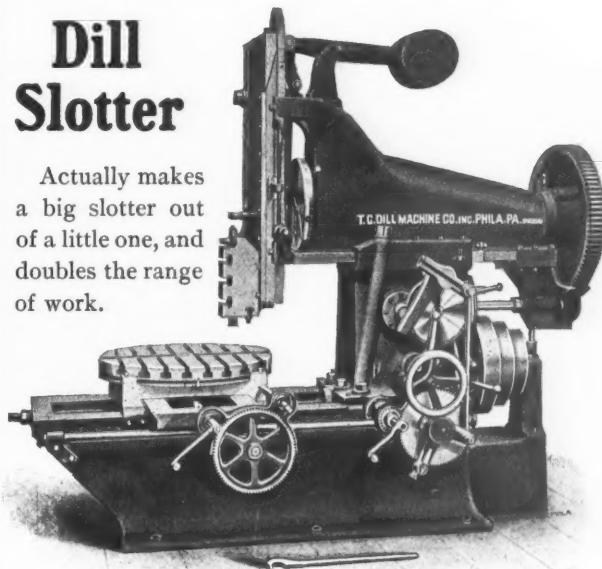
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Work can be set by power on the Dill, and set quicker than on any other machine. It has a safety device for feed mechanism, large range of speeds, quick return, hand wheel controller and other exclusive features.

Write for catalogue and get acquainted.

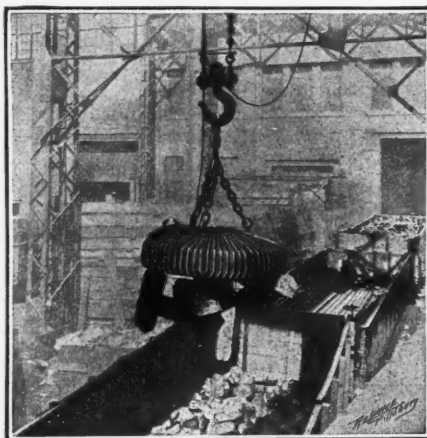
**THE DILL SLOTTOR PEOPLE
Philadelphia, Pa., U. S. A.**



LIFTING MAGNETS

For all kinds of iron and steel in bulk.

No labor required except that of crane operator.



Will reduce the cost of handling all kinds of detached magnetic material 50 to 75 per cent.

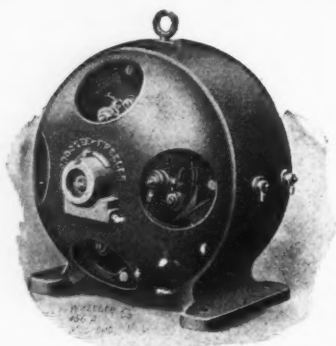
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The Electric Controller & Supply Co.
Main Office and Works, CLEVELAND, O.

136 Liberty St., New York.
200 Fremont St., San Francisco, Cal.
509-10 Woodward Bldg., Birmingham, Ala.

BRANCH OFFICES:

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Semi-Inclosed Form I Motor.
"The Machine Tool Motor."
From 3 to 90 H. P.

HONEST RATING

has helped to make the reputation of our MOTORS and GENERATORS.

A 10 H.P. Crocker-Wheeler motor is never a 7 1-2 H.P. machine rated-up.

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Crocker-Wheeler Company

MANUFACTURERS AND ELECTRICAL ENGINEERS

Ampere, N. J.

16 Branch Offices



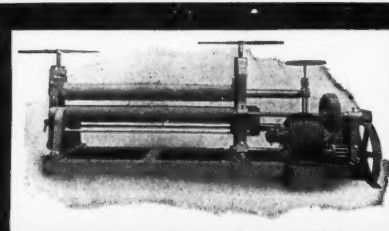
NORTHERN MOTORS FOR ALL SORTS OF WORK

Employed to cut operating costs; to improve and increase output; to expedite work.

537

We build dynamos, motors, grinders, buffers, ventilating fans, blowers; variable speed motors to operate from your two-wire circuit; afford electrical variations as high as 6 to 1, electrical and mechanical variations as high as 15 to 1. *Bulletin No. 2037-A.*

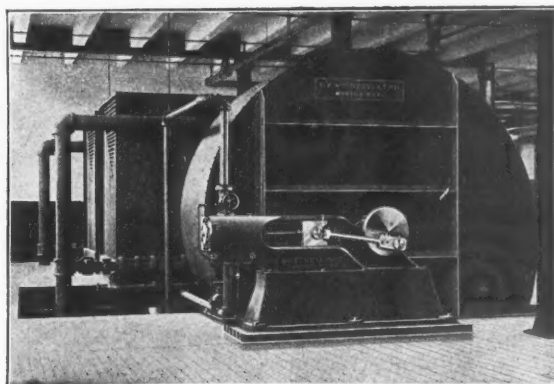
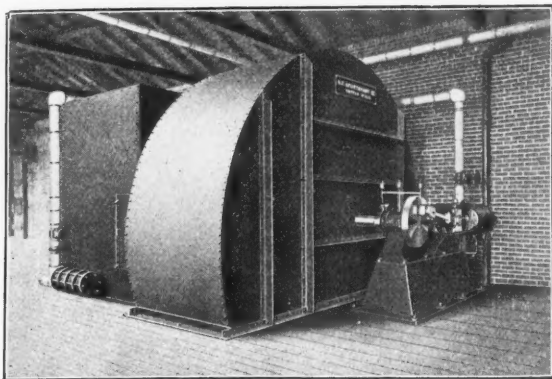
NORTHERN ELECTRICAL MFG. COMPANY, MADISON, WISCONSIN, U.S.A.
ENGINEERS -- MANUFACTURERS



NORTHERN SPHERICAL MOTOR DRIVING SCULLY BENDING ROLLS

We Have to Advertise Heating Apparatus in Summer

to remind you that such apparatus cannot be made in a day, and that it must be ordered soon if you expect to keep warm next winter. The Sturtevant Blower System is adaptable to all classes of buildings, provides positive ventilation at all times, utilizes exhaust steam and permits of massing all of the heating surface in a steel plate jacket in connection with the fan.



B. F. STURTEVANT CO., BOSTON, MASS.

General Office and Works, Hyde Park, Mass.

New York

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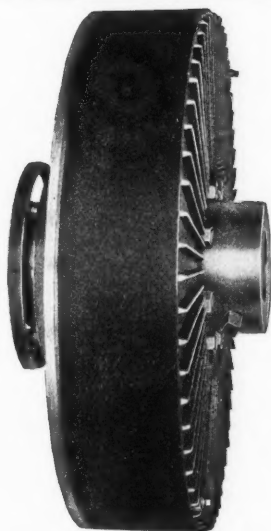
Chicago

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Designers and Builders of Heating, Ventilating, Drying and Mechanical Draft Apparatus; Fans, Blowers and Exhausters; Steam Engines, Electric Motors and Generating Sets; Fuel Economizers; Forges, Exhaust Heads, Steam Traps, Etc.

452

Least Friction at the Greatest Wearing Point



Every clutch ever made with the sole exception of the Accelerator depends entirely on friction for a starting torque.

The Accelerator gets most of its starting torque from *induction*—a magnetic drag that exerts its *greatest strength* at the *start*, thus using the *least* friction at a point where every other clutch experiences the *most* friction and consequently receives the *most* wear.

There is an *elasticity* to this drag—just enough *give* to it to make a smooth, easy start.

The wearing surfaces of the Accelerator consist of a face of cast iron against a composite face of *steel* and *babbitt*. These faces are entirely immersed in *oil*, which is not squeezed out until induction has *entirely* fallen off. Wearing friction does not *set* in until the two faces are revolving at almost the *same* speed.

These are the reasons why the Accelerator will last for years and years without any adjustment of faces.

Book One tells of the other qualities of the Accelerator, which make it the *ideal* clutch. Why not send for it *today*?

CUTLER-HAMMER CLUTCH COMPANY

M I L W A U K E E , W I S C O N S I N
New York :- Boston :- Pittsburg :- Chicago



The General Service Wrench

The wrench for everyday work, the tool to keep at hand for all occasions, the adaptable and reliable wrench is

Coes Genuine "Knife-Handle" Wrench

This is not only the original screw wrench, but the strongest and best wearing wrench made. It is furnished in seven sizes, 6, 8, 10, 12, 15, 18 and 21 inch, finished bright or black and constructed to stand the hardest kind of usage. The prominent features are: hardened steel bar and jaw, steel castings in the handle, hardened steel screw, steel rivet and key, and handle of *hard* wood, secured at both ends.

The "Knife-Handle" wrench is long wearing because it has no weak points, everything in its make-up is the best—design, material, workmanship—and every wrench is guaranteed.

Order by name at your dealers.

Coes Wrench Company

WORCESTER, MASSACHUSETTS

J. C. McCarty & Co.

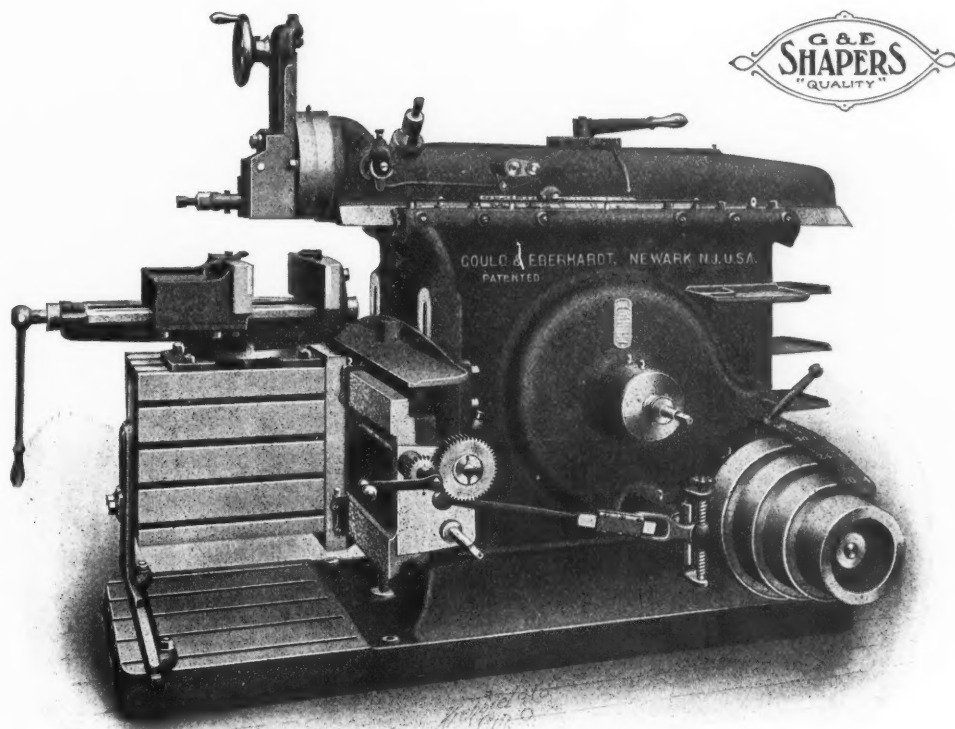
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105 Front Street, San Francisco, Cal.
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John H. Graham & Co.

113 Chambers Street, New York.
14 Thavies Inn, Holborn Circus, London, E. C.
Copenhagen, Denmark.

A Gould & Eberhardt Shaper Provides for Today and Tomorrow



34-inch "Double Triple Quick" Stroke EXTENSION BASE SHAPER.
"It beats the planer."

OUR new line of "High Duty" Shapers are not only up-to-date, but are in advance of anything ever put on the market. They have been designed with ample power and strength to obtain the fullest benefits from the high speed steels.

Our patented construction of gearing enables a high number of cutting strokes to be obtained, with a minimum of power consumption—and they have an agreeable smooth-running action even at the fastest speeds, and you get just the right speed for the job, whether fast or slow is required.

Our patented Extension Base and Support to Table feature, which we were the first to put on a shaper, is also a very valuable feature in furnishing additional rigidity to the table under heavy cuts.

They are accurately made throughout, this being an essential feature for die work, etc.

*Can be furnished with direct-connected Electric Motor Drive, if desired—tell us your voltage.
Our new Shaper Catalogue B is now ready. If you are interested a postal will bring it.*

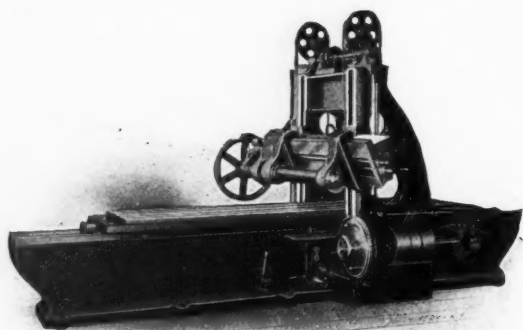
Gould & Eberhardt, Newark, N. J., U.S.A.

Designers and Builders of High Class Machine Tools

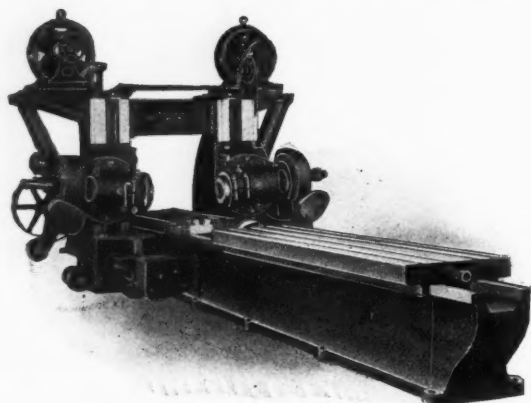
ESTABLISHED 1840

Automatic Gear and Rack Cutting Machinery, Shapers, Drill Presses

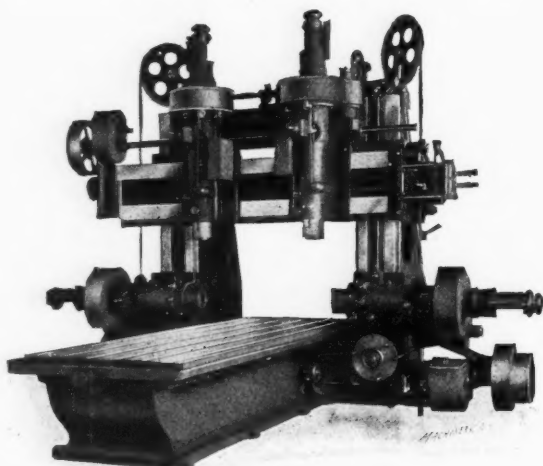
SELLING AGENTS—Baird Machinery Co., Pittsburg, Pa. Marshall & Huschart Machinery Co., Chicago. The Motch & Merryweather Mch. Co., Cleveland. The Fairbanks Co., Philadelphia and Baltimore. Henshaw, Bulkley & Co., San Francisco. Hallidie-Henshaw-Bulkley Co., Seattle. W. R. Colcord Mch. Co., St. Louis. Prentiss Tool and Supply Co., New York, Boston and Buffalo. FOREIGN AGENTS—Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Milan and Paris. Selig, Sonenthal & Co., London, England. John Lang & Sons, Johnstone, Scotland. White, Child & Beney, Shaper and Drill Press Agents, Vienna. F. W. Horne, Yokohama. Adolfo B. Horn, Havana, Cuba.



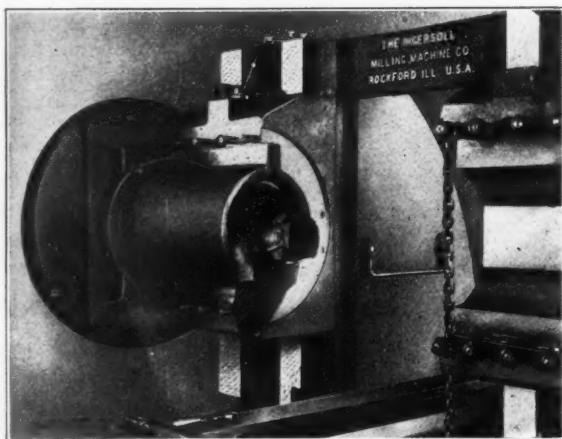
STANDARD HORIZONTAL SPINDLE MACHINE
WITH VERTICAL SPINDLE ATTACHMENT



DUPLEX HORIZONTAL MACHINE
SWIVELING HEADS



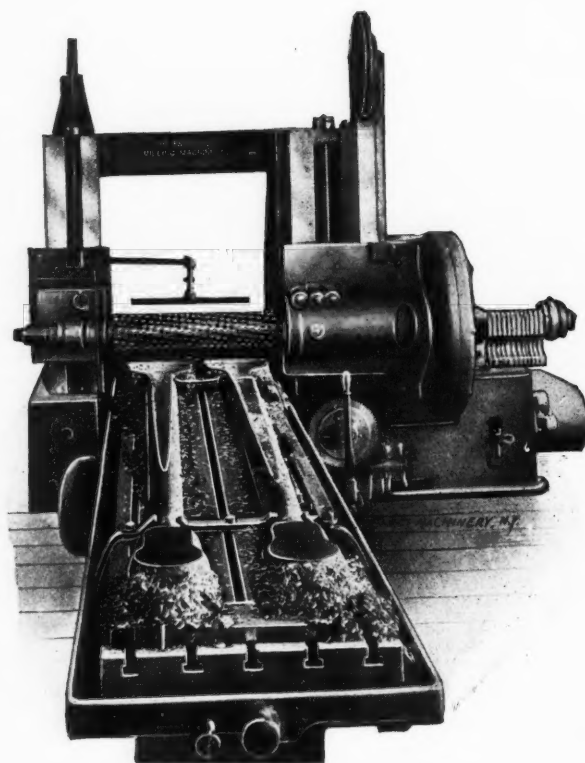
FOUR HEAD TYPE



SPINDLE BEARING OF ONE OF OUR LARGEST
MACHINES

Heavy Milling Machines Exclusively

All Types



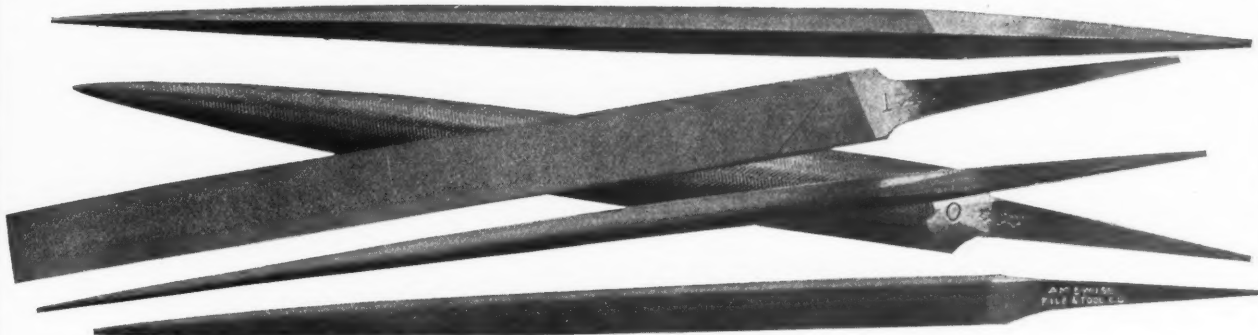
HEAVY TYPE MILLING MACHINE
MILLING CONNECTING RODS

The Ingersoll Milling Machine Company,

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**Eastern Branch,
114 Liberty Street, New York,
Walter H. Foster, Mgr.**

A Little Argument About



FILES? Yes, but——

“Only the Best are good enough”,—for—

AMERICAN TOOL MAKERS and MACHINISTS!

Ever tried “AMERICAN SWISS”?—No?—

Then kindly send for Price List and Samples.

No charge for Files used in trying them.

We offer to pay the freight on sample orders both ways, if you wish,
(because they never come back.)

KIND? Swiss Patterns, all shapes and cuts. Sizes up to 12".

QUALITY? A trial will tell.

PRICES? Lower than imported—higher than any other “made in U.S.”

MADE WHERE? Elizabeth, N. J., U.S.A.

BY WHOM? American Swiss File & Tool Co.

ENUFSED?

Oh! DELIVERY—Prompt by

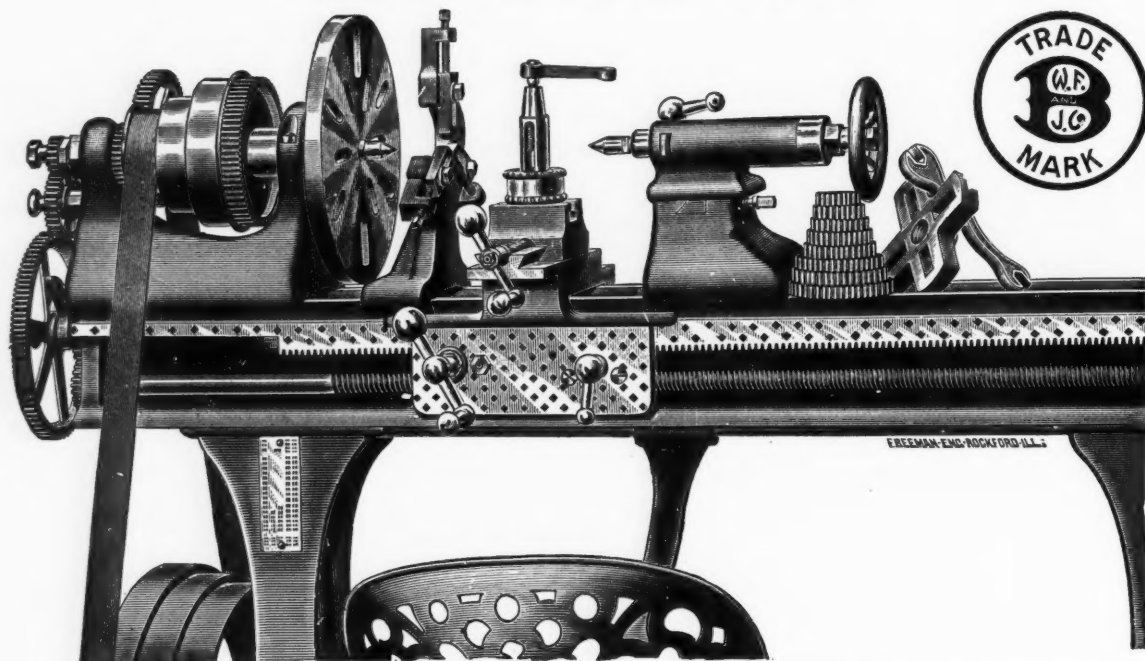
E. P. REICHHELM & CO.

Principal Owners and Selling Agents,

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Foot Power Lathes

9-INCH TO 13-INCH SWING



Screw Cutting. Hollow Spindle. Set over Tail Stock. Strong. Practical. Easy Running.

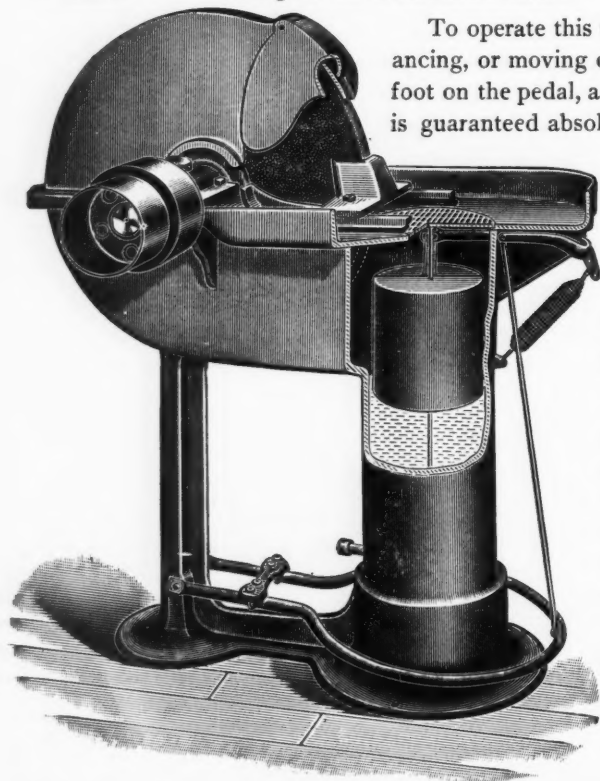


"ORIGINAL BARNES" DRILLS AND GRINDER.

Simple in Construction.

More Efficient in Operation.

To operate this Grinder requires no twisting, balancing, or moving of the whole body; just rest the foot on the pedal, a most natural position. The float is guaranteed absolutely rust proof. Wheel 2 x 24.

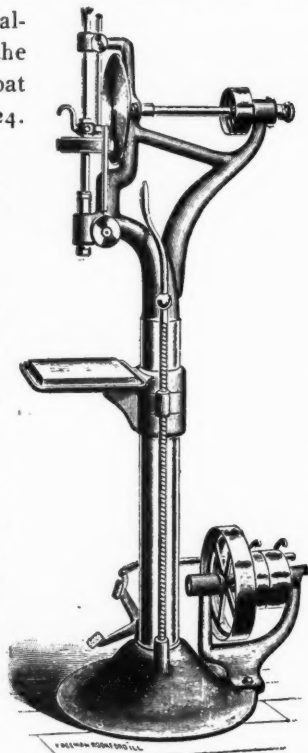


Friction Disc Drill

FOR LIGHT WORK
HAS THESE GREAT ADVANTAGES:

The speed can be instantly changed from 0 to 1,600 without stopping or shifting belts. Power applied can be graduated to drive with equal safety the smallest or largest drills within its range—a wonderful economy in time and great saving in drill breakage.

Send for Catalog.
Established 1872.



W. F. & JOHN BARNES COMPANY, 231 RUBY STREET,
ROCKFORD, ILL.

THE PRE-EMINENCE OF THE "CLEVELAND" IS INDISPUTABLE

Below are some of the reasons
why our machine excels all others
and why we stand Pre-eminent



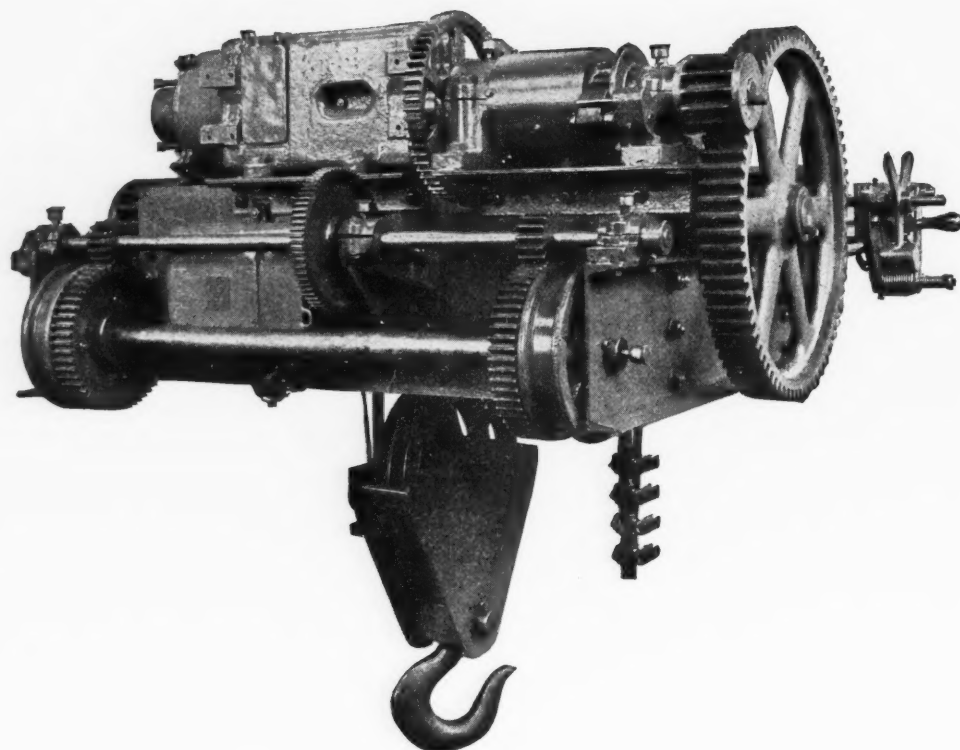
- 1st. It can be changed very quickly from one variety of work to another.
- 2d. Facility of instantly changing the feed of any tool in the series without affecting the feed of the other tools.
- 3d. Quick and accurate action of the Spindle Reversing Mechanism and mechanism for alternating the Idle and Working Movements of the feed.
- 4th. Before the other *fellow's* expert can lay out cams for producing different shaped pieces, we are producing the parts.
- 5th. Construction of the Tool Turret, provision for locking it rigidly on its largest diameter and the application of the driving power nearly in a direct line with the Spindle.
- 6th. All Tool Feed Adjustments can be made while the machine is in motion producing parts. This is something that appeals very strongly to all users of the "CLEVELAND".
- 7th. We build machines with capacities from 1-16-inch to 6-inch—24 sizes. Full Turret, 3-Hole Turret, Double Head and Plain Machines, and by the aid of our Special attachments, we can complete all operations on the most difficult shaped pieces.
- 8th. Our "Ad." in this paper the last year giving *LABOR COSTS* proves conclusively our Pre-eminence.

CLEVELAND AUTOMATIC MACHINE CO.
CLEVELAND, OHIO, U. S. A.

Foreign Representatives—Messrs. Chas. Churchill & Co., London, Birmingham, Newcastle-on-Tyne and Glasgow. Messrs. Schuchardt & Schutte, Berlin, Vienna, Stockholm and St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milano and Bilbao.
Canadian Representative—H. W. Petrie, Toronto. Eastern Representative—J. B. Anderson, 2558 North 30th St., Philadelphia, Pa.

Electric Traveling Cranes

Three Motor. Twenty tons and under.



THE cut shows a 10-ton trolley in which the load is carried on wire rope. Bearings have grease cups. Hoist has automatic cut-out to prevent overrunning of hook in hoisting, electric brake to bring armature to a prompt stop when current is cut off, and automatic mechanical brake which holds the load at all points.

MARIS BROTHERS

56th and Gray's Avenue

PHILADELPHIA, PA., U. S. A.

Manning, Maxwell & Moore, Inc., Agents, New York, Boston, Pittsburg, Chicago, Cleveland.

	<h2>The Gardner Grinder</h2> <p>Spiral Circles Spiral Grooved Discs</p>	
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Another Example of Grinding Economy

The illustration above shows two shop boys grinding sprues off malleable iron castings, both working at one Gardner Grinder and each finishing over two hundred pieces an hour. Work of this character can be done on the Gardner in half the time usually required, a better finish is secured and the machine can be run by an unskilled operator. Write us for points on grinding, or better still, **send us a sample of something you are doing**—we will finish and return it free of charge, marking the time, size of grinder used and the composition of spiral circles.

Charles H. Besly & Company

ORIGINATORS OF DISC GRINDERS

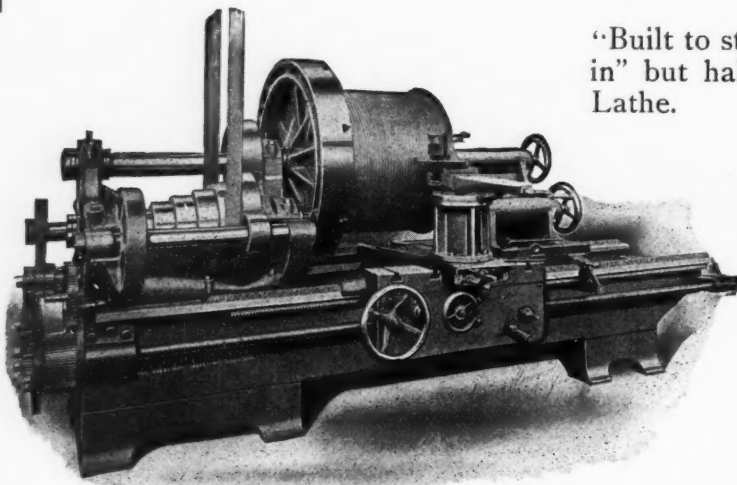
15-17-19-21 South Clinton Street, Chicago, Illinois, U. S. A.

McCABE'S LATHE RUNS AND RUNS AND RUNS

There's no "Let up."

If one spindle isn't running, then the other is. It's "all day" with this two-swing Lathe.

Run it as a 48-inch Triple-gear,ed,
Run it as a 26-inch Back-gear,ed.



"Built to stand the gaff" but they don't "stand you in" but half the expense of a high-cost 48-inch Lathe.

Won't take much "guff" on our part to place one in your shop. Bet catalog will do it—that's all.

J. J. McCABE

14 Dey Street
NEW YORK CITY

FOREIGN AGENTS:

Chas. Churchill & Co., London, Birmingham, Manchester and Glasgow.

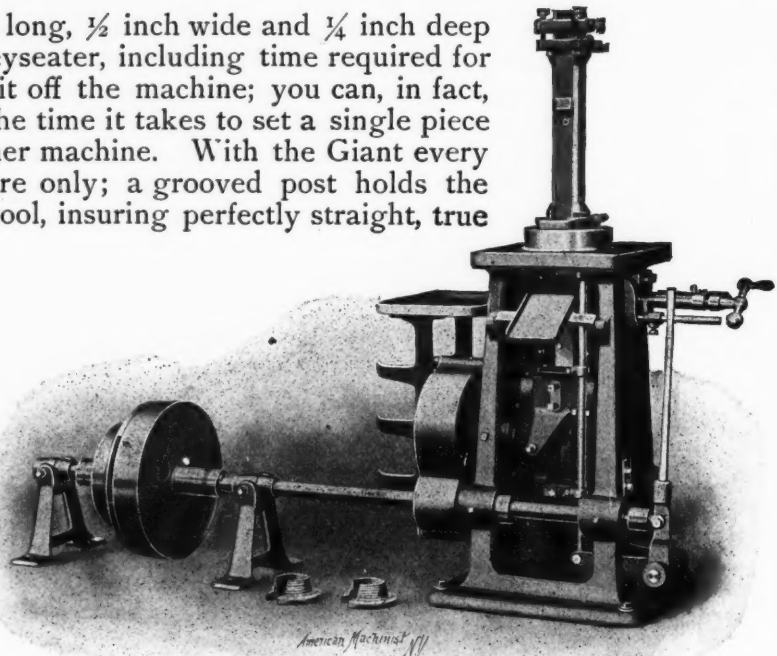
R. A. Hervey, Sydney, N. S. W., Sole Agent for Australasia.

McCabe's "New style" 26-48-inch "Double-Spindle" Lathe

Six-inch Keyseats in Two Minutes

You can cut a keyseat 6 inches long, $\frac{1}{2}$ inch wide and $\frac{1}{4}$ inch deep in two minutes on the Giant Keyseater, including time required for putting the work on and taking it off the machine; you can, in fact, *finish* two ordinary keyseats in the time it takes to set a single piece ready for keyseating on any other machine. With the Giant every job is set and fastened by its bore only; a grooved post holds the work and forms a guide for the tool, insuring perfectly straight, true keyseats whether the hole is straight or taper, or whether the hub is faced true or left rough as it comes from the foundry. This feature alone represents a saving that will soon cover the cost of the machine.

Giant Keyseaters are built in six sizes, cover a wide range of work and are easily and quickly adjusted to different requirements.



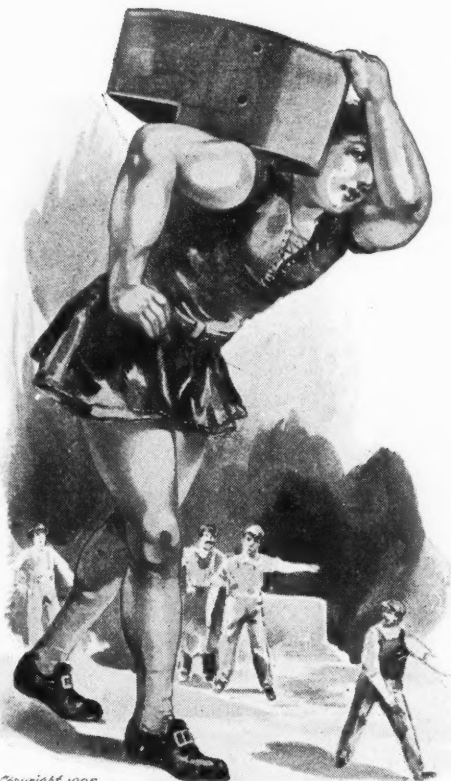
Catalogue mailed on request.

No. 4 Keyseater with 3 11-16 inch post.

Mitts & Merrill, 843 Water Street, Saginaw, Mich., U. S. A.

FOREIGN AGENTS—C. W. Burton, Griffiths & Co., London, England. Penrhyn Neville, Milano, Italy.

The Benevolent Giant Easily Carries Heavy Weights

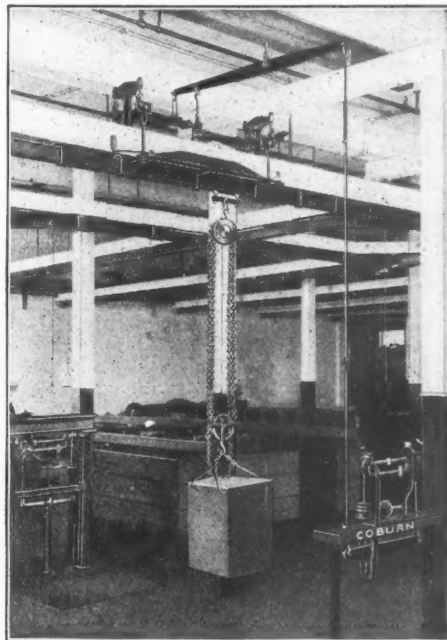


Copyright, 1905.
The Coburn Trolley Track Mfg. Co.

It's astonishing with what ease heavy burdens of from one to seven tons are handled by the Benevolent Giant. He lifts as much as twenty men.

The Coburn Trolley Track

Is a one man machine. It means that one man can do the work ordinarily requiring three and do it in half the time. It has revolutionized transportation of light or heavy loads indoors or out. Labor costs money and the Coburn Track is a labor saver.



Write for our Catalogue

The Coburn Trolley Track Mfg. Company, Holyoke, Mass., U.S.A.

Adjustable Thread Cutting and Milling Tool



FOR GENERAL BRASS FINISHING AND MACHINE WORK.

Five sizes carried in stock, each size having

An Adjustment of 1-2 inch

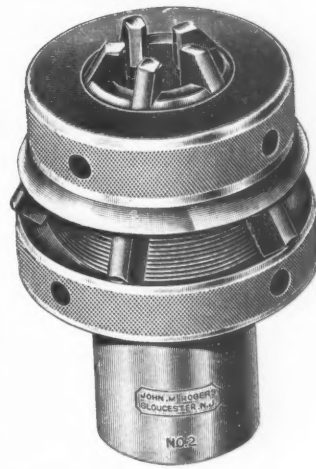
and can be used for any diameter within that range, either for thread cutting or straight turning. They are extremely simple in design and are adaptable to

much special work, such as Counter Boring, Facing, Pointing and Cutting Tapers. If finished samples are sent we will make special cutters to do your work. Write for our new catalog of Small Tools, No. 7.

**Quickly adjusted
with a
Spanner Wrench.**

CAUTION.

This tool is covered by U. S. letters patent, and all persons are cautioned against manufacturing, using or exposing for sale infringements on this tool.

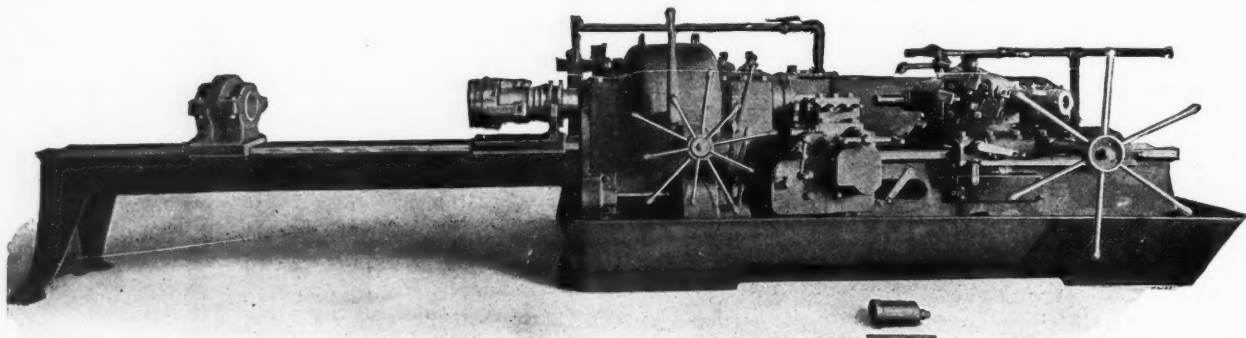


**Are Self-Centering
and
adjustment is positive.**

SMALL TOOL DEPARTMENT

The John M. Rogers, Boat, Gauge and Drill Works
GLOUCESTER CITY, NEW JERSEY, U. S. A.

FOREIGN AGENTS—Chas. Churchill & Co., London, E. C. C. W. Burton, Griffiths & Co., London, E. C. Selig, Sonnenthal & Co., London, E. C. Henry Kelley & Co., Manchester, England. V. Lowener, Copenhagen, Denmark. DeFries & Co., Dusseldorf, Germany.



An Important Point of Difference

Between the Bardons and Oliver 6x42 Turret Lathe and other heavy turret lathes is the chuck used for holding the stock. In our machine we use an improved form of our standard automatic chuck, which has proved without equal for gripping power and holds the stock so firmly that forming tools up to 12 and 14 inches in width can be employed. Another difference is the concentric support for the outer end of bar stock, a method which adds materially to the accuracy of the work produced. The New Automatic-Chuck Turret Lathe is not only the most powerful machine of the type, but owing to its improved construction will produce more work in a given time, and more accurate work, than any other turret lathe operating on bar stock. *Let us send you descriptive circular and examples of rapid work.*

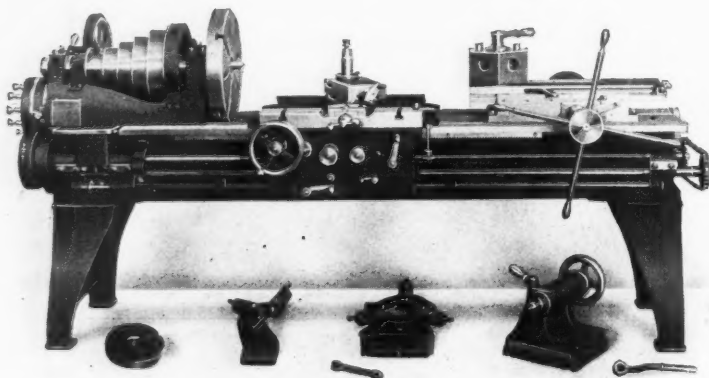
Bardons & Oliver, 20 Water Street, Cleveland, Ohio

Builders of Turret Lathes from $\frac{3}{8}$ -inch to 6-inch capacity

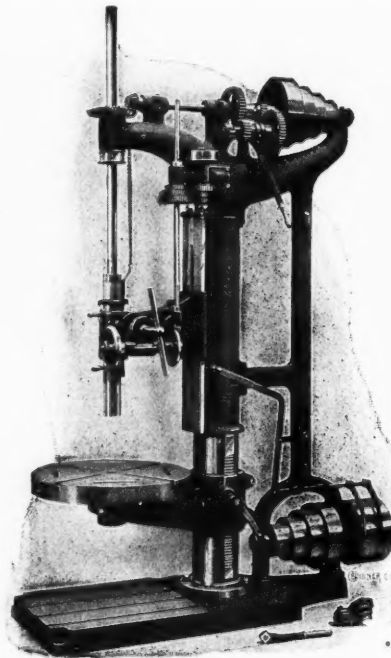
J. W. Cregar Agency, The Bourse, Philadelphia, Complete Line of Turret Lathes in stock. The Marshall & Huschart Co., Chicago, Ill.
Vandyck-Churchill Co., New York.

"Tools for the Machine Shop"

Write for our booklet with the above title and get acquainted with the Hamilton line of Lathes, Shapers, Upright and Radial Drills. A first class equipment of machine tools gives your plant the backbone that is necessary for a promise-filling, profit-bringing business, and a "Hamilton" equipment *is first class.*



18" x 8' Style "A" Lathe with Compound Rest and Power Feed Turret on Shears

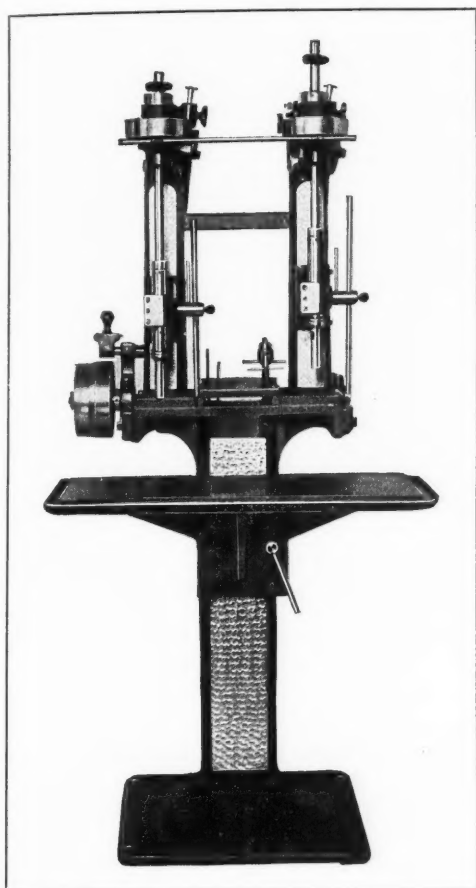


Hamilton 32' Upright Drill, Regular Pattern

Hamilton Planers

are a recent addition to our line of manufacture. Spur geared and Spiral geared. 30" to 96". *Special circular on request.*

The Hamilton Machine Tool Company
Hamilton, Ohio, U. S. A.



The Spindle Pulleys

on the new

Henry & Wright Ball Bearing Drill

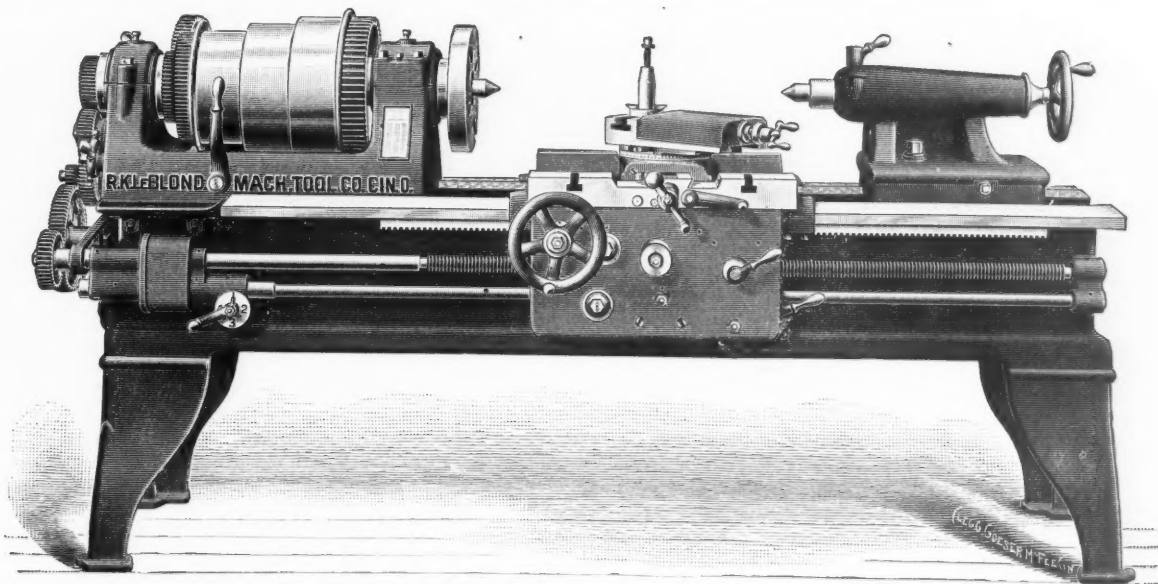
RICE PATENTS

are equipped with ball bearings attached to an independent sleeve, which entirely relieves the spindle from belt strains. The spindle pulley and the driving pulley have each two steps, and two intermediate idler pulleys form a perfect and instantaneous belt tightening device, and give a range of four speeds with one continuous cemented belt instead of the usual three speeds with three and four step pulleys and two laced belts.

This advantage of belt travel combined with frictionless journals make possible very high speeds in every-day practice and helps to explain why the output of this new drill is from 200 per cent. to 400 per cent. greater than that of any other drill.

SEE OUR CATALOGUE FOR FULL DESCRIPTION

The Henry & Wright Mfg. Company
HARTFORD, CONNECTICUT



LeBlond 20" High Speed Engine Lathe

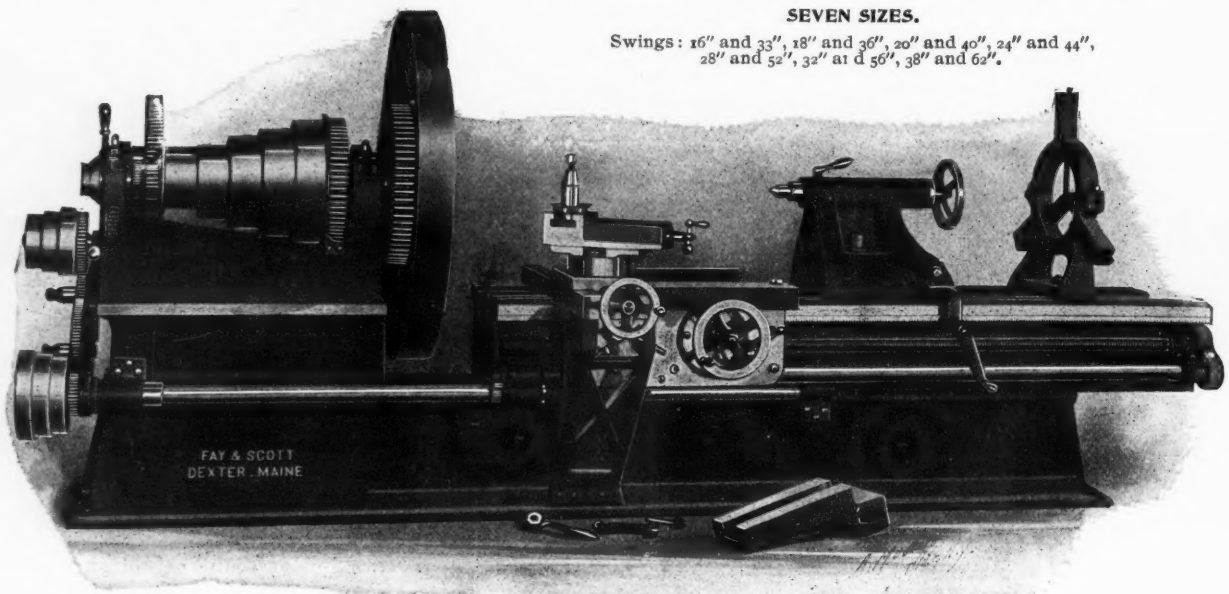
Has 18 spindle speeds ranging from 32 to 275 revolutions per minute. Correct cutting speed can be obtained for practically all diameters. Our double friction back gear gives it the pulling power and is a great improvement over any other friction head. Cone is 11 1/2" to 13 1/2" diameter for 4 1/2" belt.

The R. K. LeBlond Machine Tool Company
4605 Eastern Avenue, Cincinnati, Ohio

Extension Gap Engine Lathes.

SEVEN SIZES.

Swings: 16" and 33", 18" and 36", 20" and 40", 24" and 44",
28" and 52", 32" and 56", 38" and 62".



This new improved engine lathe is designed to meet the demand for a tool capable of turning work of large diameter and extra length, as well as doing work accurately and well within its ordinary capacity. It combines two lathes in one, not being at all cumbersome for ordinary work.

For further particulars, address,

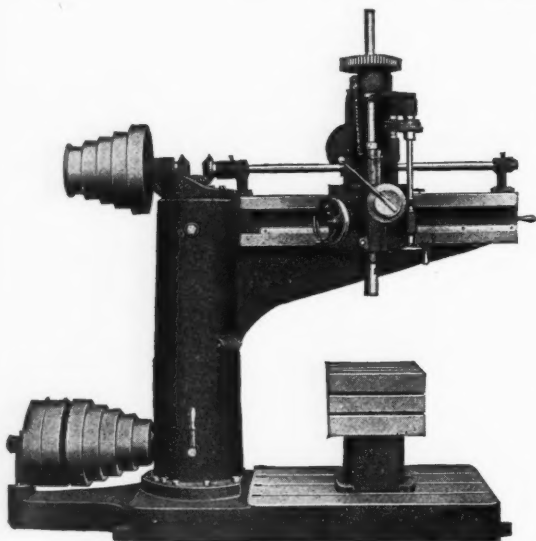
Prentiss Tool & Supply Co., Sole Selling Agents, **115 Liberty St., New York.**

Boston: 145 Oliver Street.

Buffalo: 507 D. S. Morgan Bldg.

SEMI RADIAL

For Drilling and Heavy Tapping



This machine is built to stand hard knocks and is admirably adapted to that class of work done in Boiler Shops, Rolling Mills, Architectural Iron Works, Pump Shops, etc.

The bearings are of uncommon length suitable to the heavy work for which the machine was built.

The tool is particularly efficacious when tapping—our 4 ft. size back-geared machine being able to pull a 6" tap through 2" of cast iron at 11 revolutions of spindle per minute.

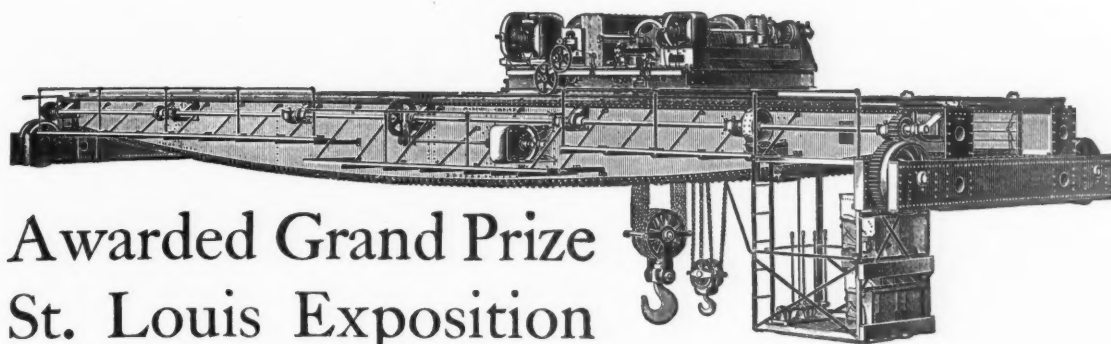
SEND FOR CIRCULAR.

THE BICKFORD DRILL AND TOOL CO.

CINCINNATI, OHIO, U. S. A.

FOREIGN AGENTS—Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg, New York. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, New York. Charles Churchill & Co., Ltd., London, Birmingham, Manchester, Newcastle-on-Tyne and Glasgow. Andrews & George, Yokohama, Japan. H. W. Petrie, Toronto, Canada. Williams & Wilson, Montreal, Canada.

The Shaw Electric Traveling Crane



Awarded Grand Prize
St. Louis Exposition

Manufactured by **The Shaw Electric Crane Co.,** Muskegon, Mich.

It is used in the MACHINE SHOP, the POWER HOUSE, the FOUNDRY,
the STEAM PLANT.

It has few parts and is therefore simple and accessible.

It is durable, absolutely reliable and efficient.

The workmanship is top grade and the operating parts interchangeable.

If you want something *special* we build it.

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It's just the thing for screw machine or turret lathe work—in fact, it is a perfect substitute for oil for boring, turning, drilling, cutting, sawing, planing, etc.; better even than oil for such operations. It is clean, odorless, non-inflammable, free from acids, will not gum or corrode, has a cooling effect on the work and leaves it bright and clean at the completion of operation.

There is no bother in preparing Lubria; it mixes perfectly with water. Just take about twenty times as much cold water as Lubria, stir well together and you will have a lubricating compound possessing all the properties of oil—minus dirt and stickiness—at a mere fraction of the cost.



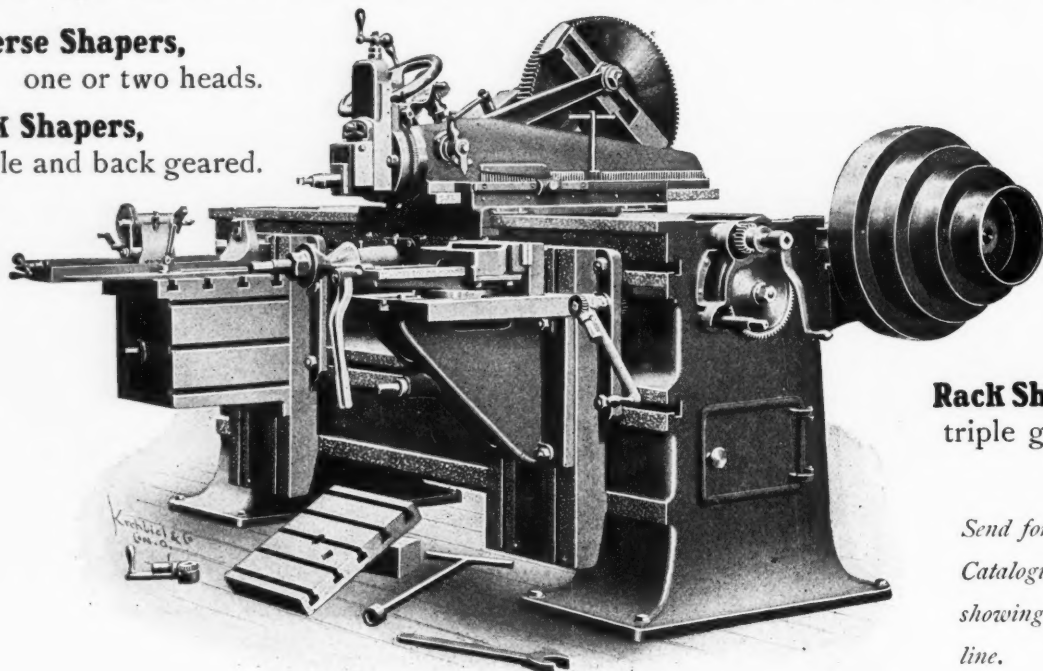
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Traverse Shapers,
one or two heads.

Crank Shapers,
single and back geared.



Rack Shapers,
triple geared.

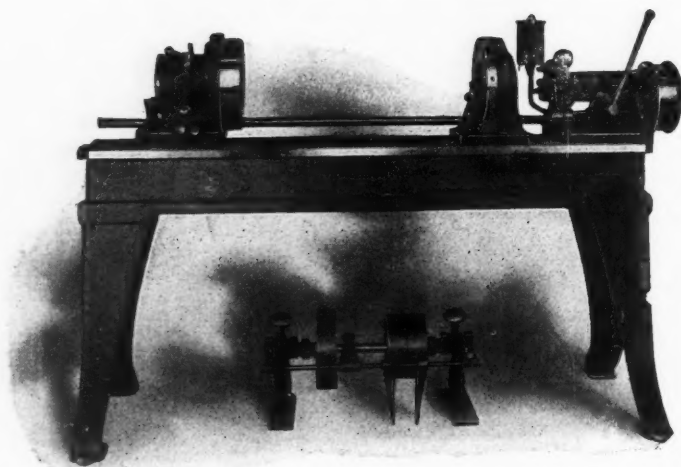
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The Cincinnati Shaper Company, Cincinnati, Ohio, U. S. A.

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THE WHITON Revolving Centering Machine

For Accurately Centering Finished Shafts.



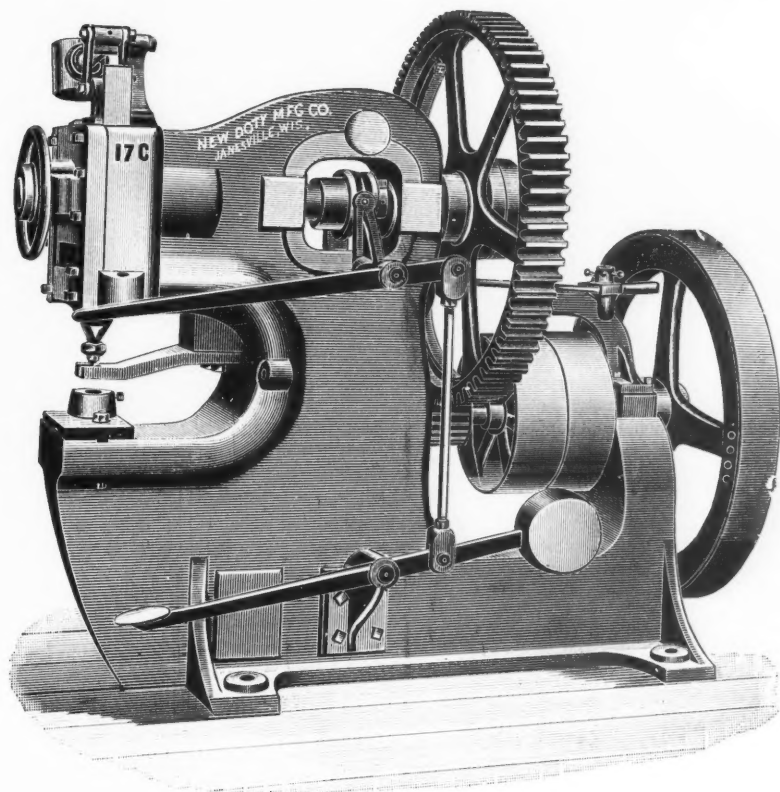
The cut shows new REVOLVING CENTERING machine—a larger size of the well known machine of this type. It is heavier throughout and has capacity to center shafts up to 5 inches in diameter.

Constructed same as the smaller machine and embodies all the special features.

Circular and prices sent upon application.

The D. E. Whiton Machine Company,
New London, Connecticut.

NEW DOTY PUNCHES

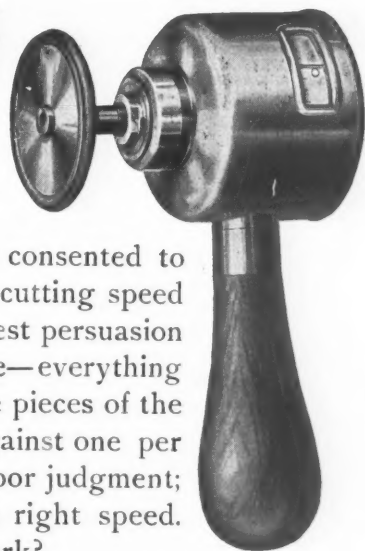
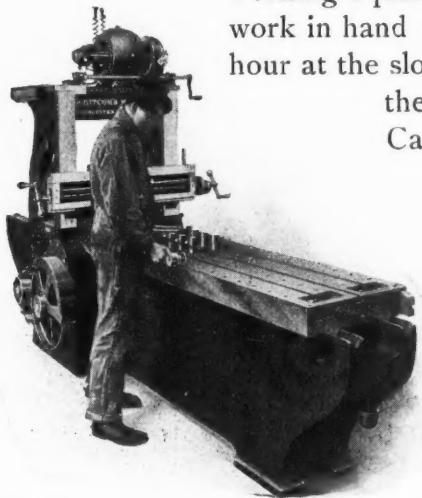


New Doty Mfg. Co., Janesville, Wis.

Test the Cut-Meter Yourself

A personal trial of this money-saving instrument
is better than reams of argument.

The manager of a certain big shop somewhat doubtingly consented to give it this trial and on the very first machine tested found the cutting speed to be only 25 feet per minute—a brass job at that. A little earnest persuasion induced the operator to increase the speed to 150 feet per minute—everything working equally well—with the result that five pieces of the work in hand were finished each hour as against one per hour at the slow speed. Merely a matter of poor judgment; the operator *guessed* he had the right speed. Can you afford to trust to guesswork?



The Cut-Meter shows instantly and easily the cutting speed in feet per minute of any machine tool. It is simple, durable, can be held in any position, used on any machine—a shop necessity.

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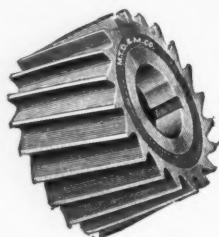
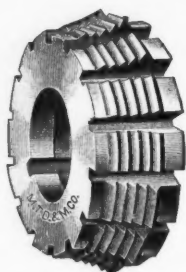
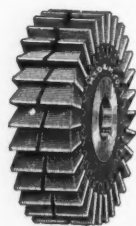
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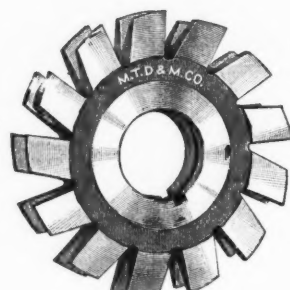
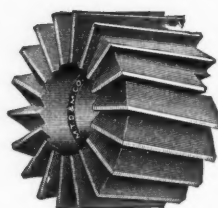
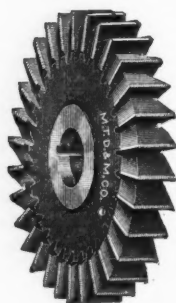
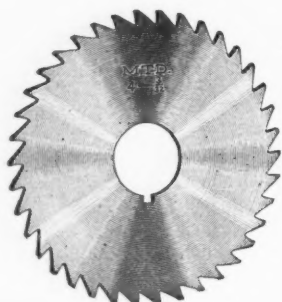
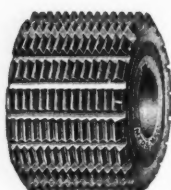
Sole Agents for Great Britain, C. W. Burton, Griffiths & Co., London, England.
Sole Agents for Canada, Fairbanks & Co., Montreal, P. Q.

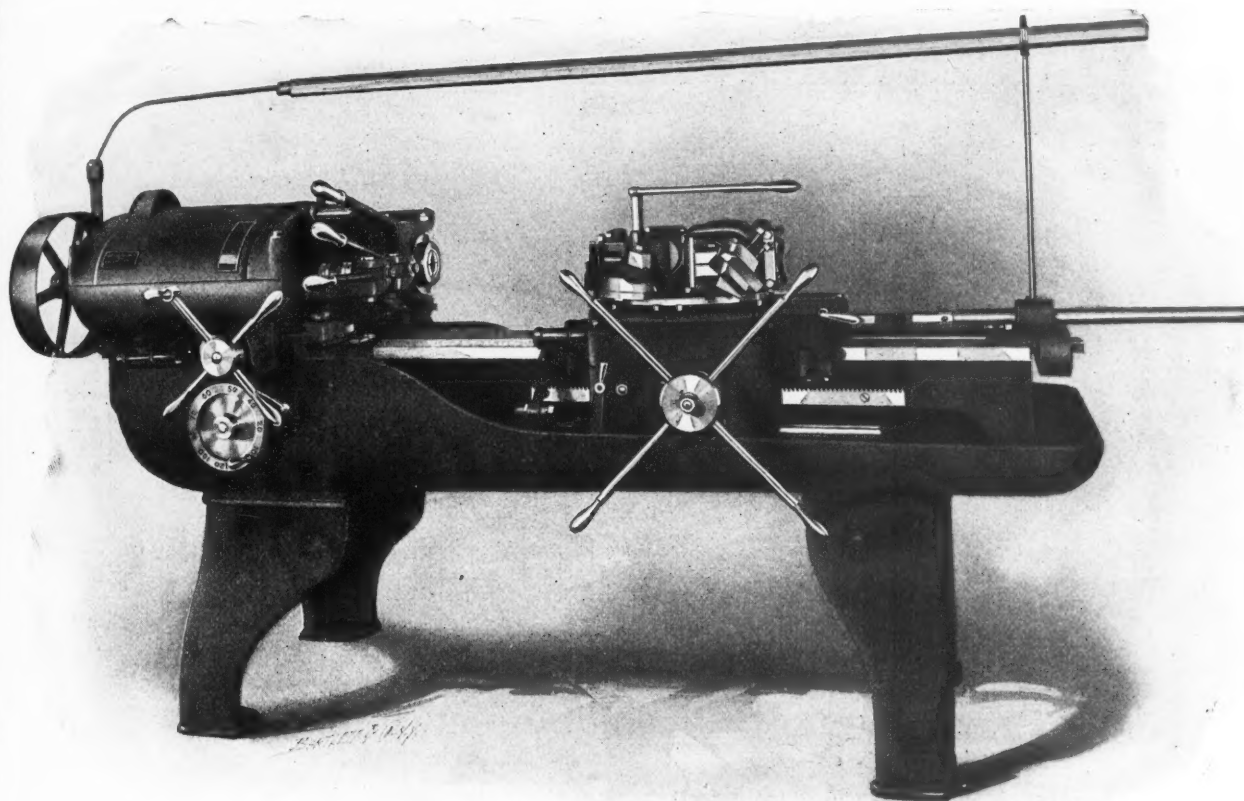


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MORSE CUTTERS
the better you will like them

We make Cutters for heavy milling; for milling standard slots; for milling irregular forms; for milling slots in heads of screws; for milling angles; for milling spiral mills; for milling half circles and sprocket wheels; for milling plain surfaces; for milling heads of taps, also nuts and bolts; for milling roughing cut in gears of coarse pitch, and for milling teeth in gears.

**MORSE TWIST DRILL AND
MACHINE COMPANY**
New Bedford, Massachusetts, U.S.A.





The Flat Turret Lathe

Has the peculiar advantage of permitting several operations to be completed at one station of the turret; this is accomplished by the Cross Sliding Headstock, and is a time saving feature that cannot be overestimated. The cross feed has ten stops and the turret twelve stops. All changes of feed and speed are instantly obtainable. Turret stops operate in either direction. Turret turns automatically to position required, skipping other positions. Turning tools do not overhang. Locking pin is directly under the cutting tool. The advantages enumerated are but a few of the exclusive features of the Flat Turret Lathe; we shall be pleased to send a representative to fully explain the machine if you are interested.

The Flat Turret is made in two sizes, 2x24 and 3x36, has a full equipment of universal tools and is equally adapted for work from the bar or chucked work. On duplicate lathe work we can guarantee a saving that will range from 50 to 80 per cent. Write today.

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are made for the most particular mechanics,—workmen with whom accuracy is essential.

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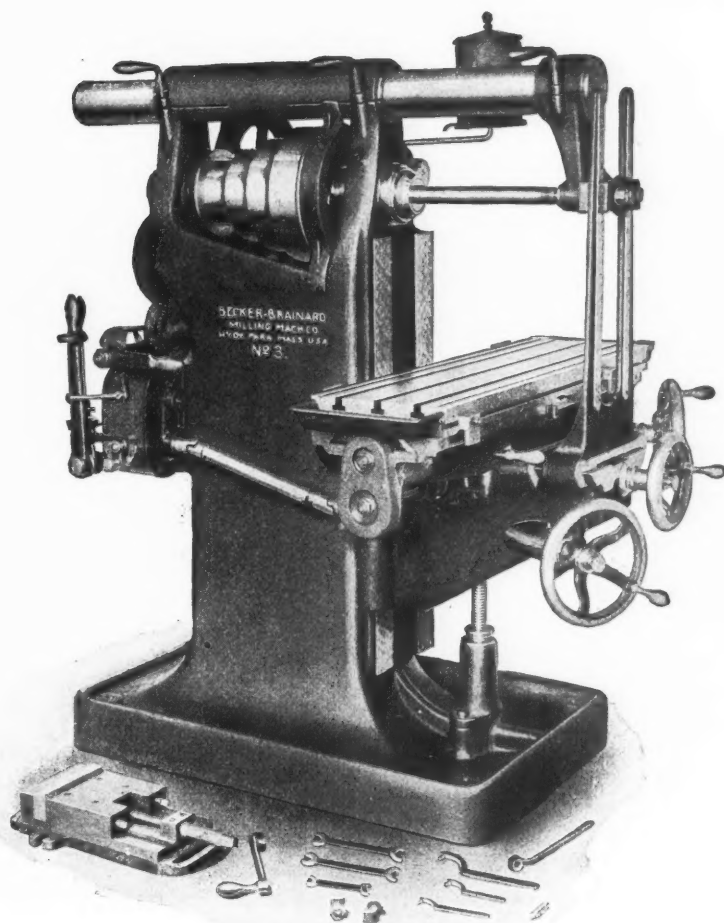
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UNEXCELLED FOR RAPID PRODUCTION OF HIGH GRADE WORK.

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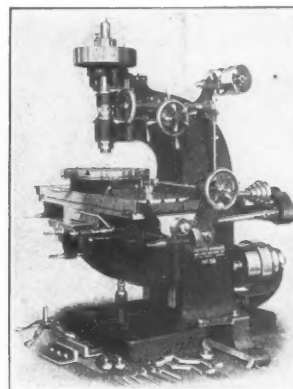
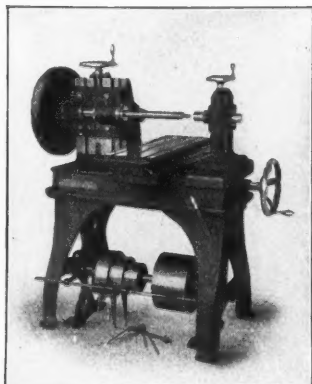
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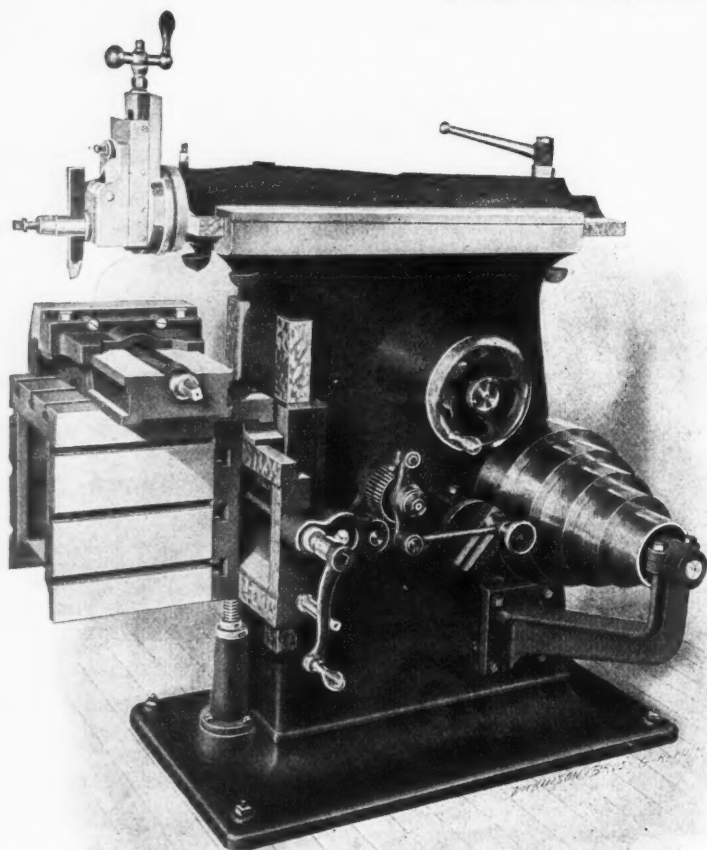
Branch Offices—The Bourse, Philadelphia, Pa.,
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Agents—McDowell, Stocker & Co., Chicago, Ill. Chas. G.
Smith & Co., Pittsburgh, Pa. J. L. Osgood, Buffalo, N. Y.
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Walcott Latest Improved 16-inch Elliptical Geared Crank Shaper

WITH BACK GEAR



10 Speeds.

Wide Range of Feeds.

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Keeps the feed entirely in the return stroke for all positions of the cross rail. Nothing to adjust but the crank plate knurl, and that only when a change of feed is wanted.

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Elliptical Geared Crank Shapers,

16" and 18" stroke.

Engine Lathes,

18", 22", 24", 32", 36" any length bed, even feet.

Turret Lathes,

18" and 22"—6', 8 and 10' beds.

Rack Cutters,

60" x 10" full automatic.

60" x 10" half automatic.

96" x 10" full automatic.

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Tool post turrets for 15", 18" and 22" lathes.

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We don't expect to get an order from you for doing your welding until we are permitted to demonstrate to you the advantages you'll derive by turning over to us your most difficult welds.

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will convert your welding days into welding hours and will always reduce your cost of manufacture, save you worry, delays and trouble.

You have only to write us to find out just what we do and how well we do it.

An inquiry usually leads up to a trial order—and a trial order convinces the most skeptical that welding, as we do it, is what you need.

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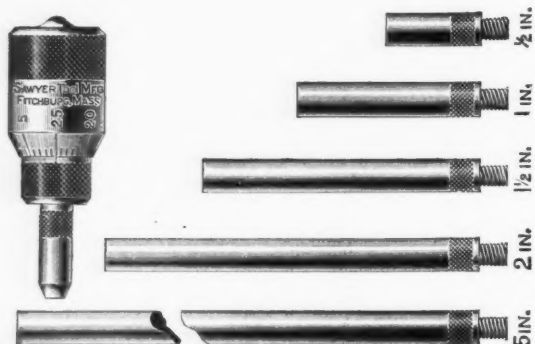
THE STANDARD WELDING Co.

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Western Representatives, McClernan & Orr, Chicago

SAWYER

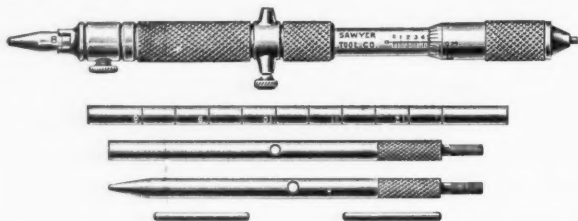
INSIDE MICROMETERS
are correct in design,
accuracy and finish.



No. 144, the smallest and neatest Inside Micrometer made, measures accurately by thousandths or fractions, from $1\frac{1}{2}$ " to $12\frac{1}{2}$ ". List price \$4.00.



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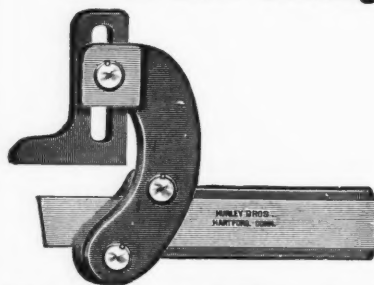
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H. B. Pat. Cutting-off Tool.

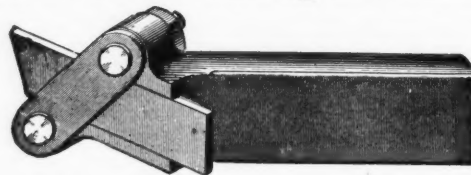
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New
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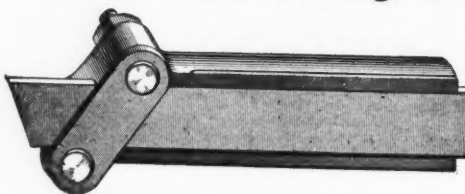
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Slate No. 2 Offset Cutting-off Tool.

Shank
 $1\frac{1}{8} \times 1\frac{1}{2}$ "



Slate No. 2 Cutting-off Tool.



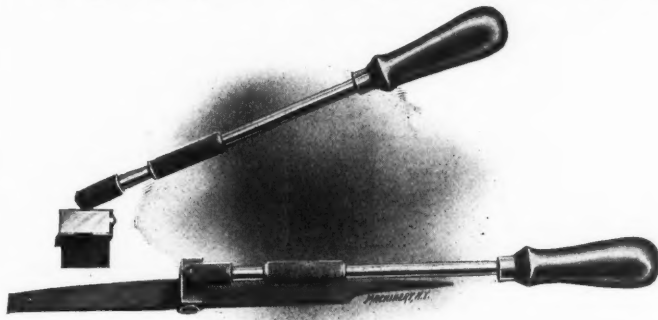
Shank
 $1\frac{1}{8} \times 1\frac{1}{2}$ ".
Blades
 $\frac{1}{8}$ to $\frac{1}{4}$ "
by 16ths.
Special sizes
by 1000ths
made to
order.

Also Crescent Cutting-off Tools. Straight shanks, no projections, for screw machine use. No. 2, $1\frac{1}{4} \times 1\frac{1}{2}$ ". No. 3, $1\frac{7}{8} \times \frac{5}{8}$ " shank. No. 2 blades $\frac{7}{8}$ " wide. No. 3, 1" wide, all thicknesses. For sale by supply dealers, or

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Designed for Securely Holding Full Sections of Various Cuts and Shapes of Short Files or Whole Files.



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Files and Short Files are Interchangeable as follows:

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Their accuracy and durability are due to special construction. Every micrometer carefully tested before being shipped.

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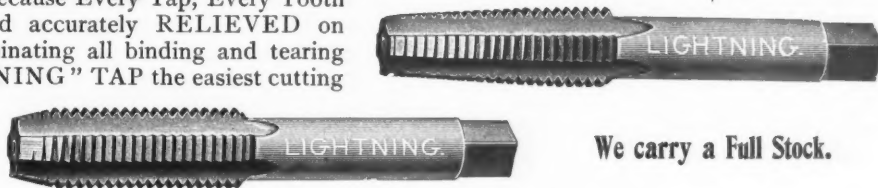
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The BEST Taps in the market, because Every Tap, Every Tooth on Every Tap, is carefully and accurately RELIEVED on special designed machines, eliminating all binding and tearing of threads, making the "LIGHTNING" TAP the easiest cutting Tap produced.

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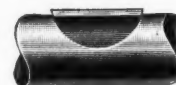
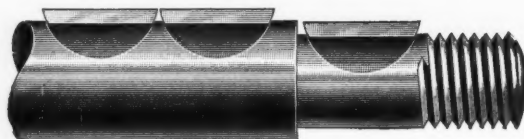
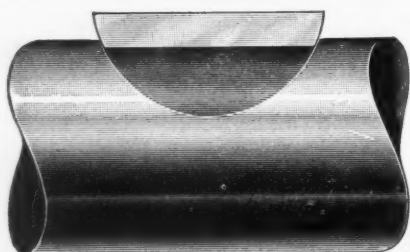
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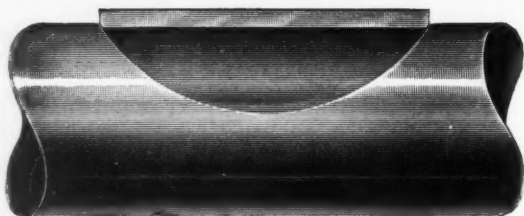
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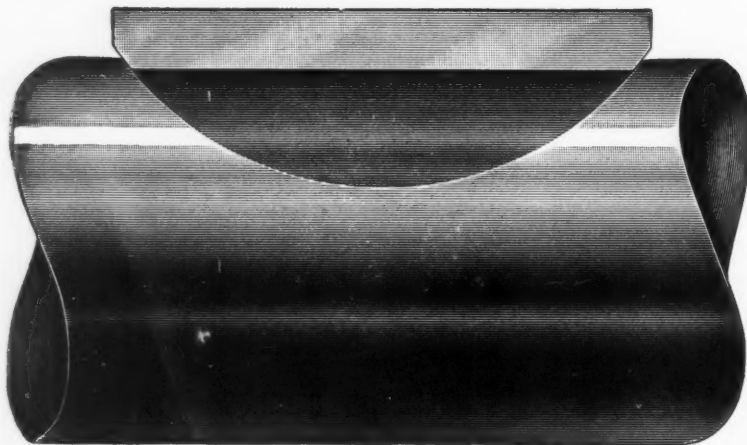
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THE WOODRUFF PATENT SYSTEM OF KEYING



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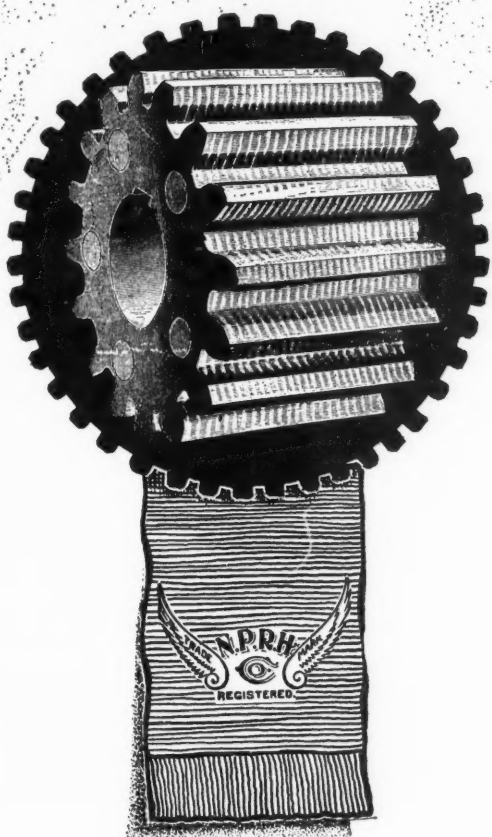
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NOISELESS PINIONS FOR MOTOR DRIVES

The substitution of a New Process Pinion for your old metal pinion will do away with the noise which in many cases is so distracting that it lessens the attention that a workman can give his work and decreases the effectiveness of his labor.

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Why not put your Planing on a High Speed Basis?

A Cincinnati Variable Speed Planer will do it for you and add a pleasing percentage to profits by its effect on cost of production. The Cincinnati has six cutting speeds, any one of which can be engaged without changing the speed of return—it has other features of advantage, too, that adapt it for use with high speed steels.

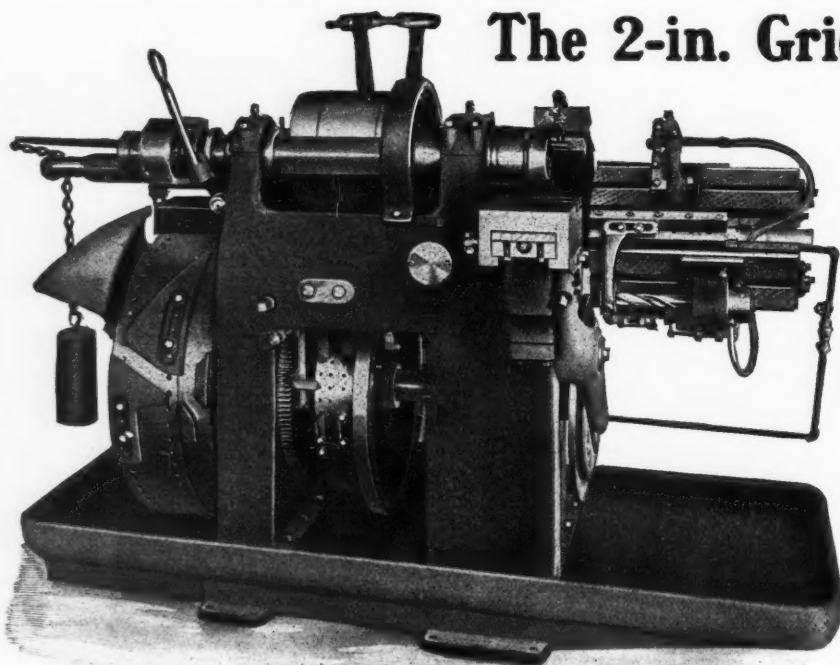
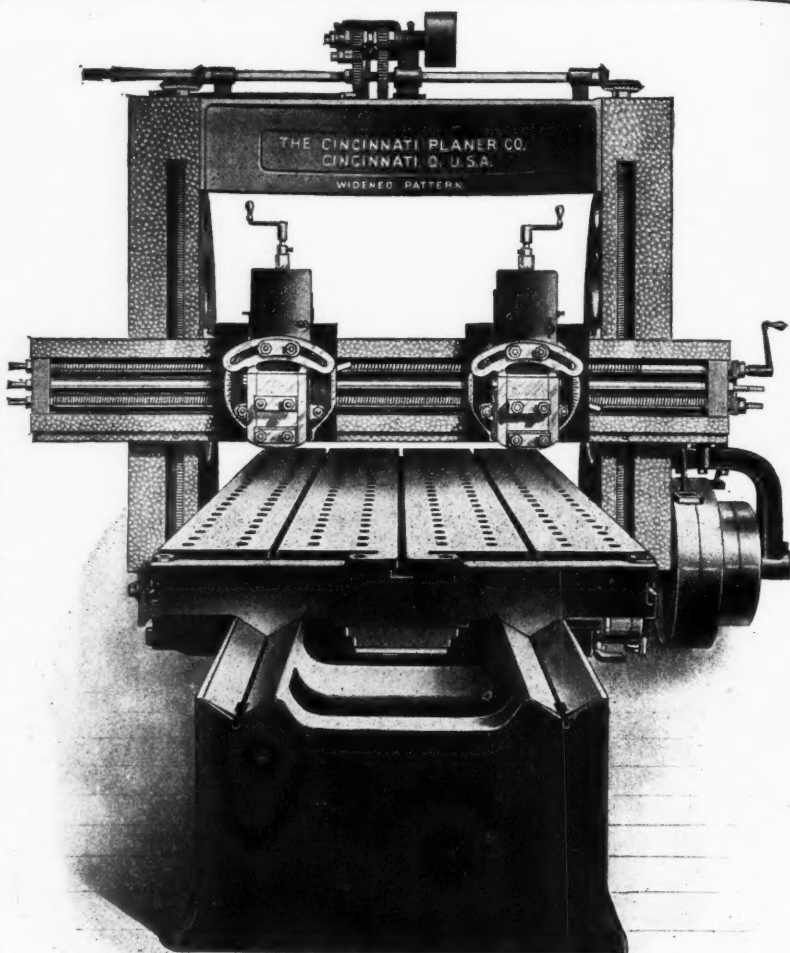
Belt or motor drive.

CATALOGUE?

The Cincinnati Planer Company Cincinnati, Ohio U. S. A.

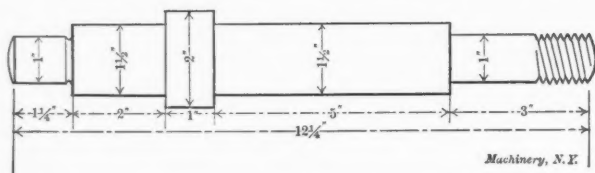
CANADIAN AGENTS—H. W. Petrie, Toronto, Canada.
Williams & Wilson, Montreal.

FOREIGN AGENTS—R. S. Stokvis & Zonen, Rotterdam,
Holland. J. Lambercier & Co., Geneva, Switzerland. Ludw.
Loewe & Co., Berlin.



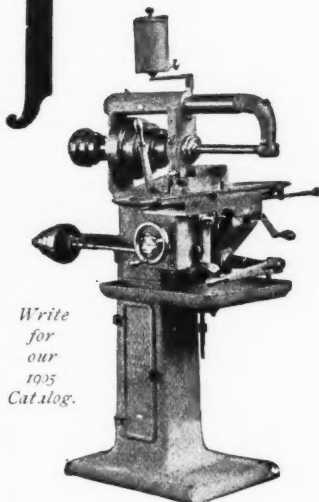
The 2-in. Gridley Automatic Turret Lathe

Does not
require an
expensive
outfit of
tools, and
it does work
twice the
length of
any other
Automatics.



Windsor Machine Company, Windsor, Vt.

Fox Metal Working Machine Tools

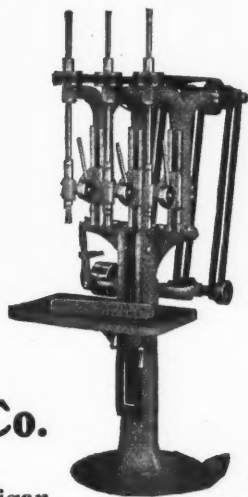


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our
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No. 3 Miller

We also make a complete line of tools for the Pattern Shop—Wood Trimmers, Band Saws, Buzz Planers, Wood Lathes, Mitering Machines, etc.

Include Hand and Power Milling Machines made in three sizes. High Speed Drills, one, three and six spindles. Tube or Pipe Cutting Machines made in three sizes. Belt and Crank Shapers, etc.

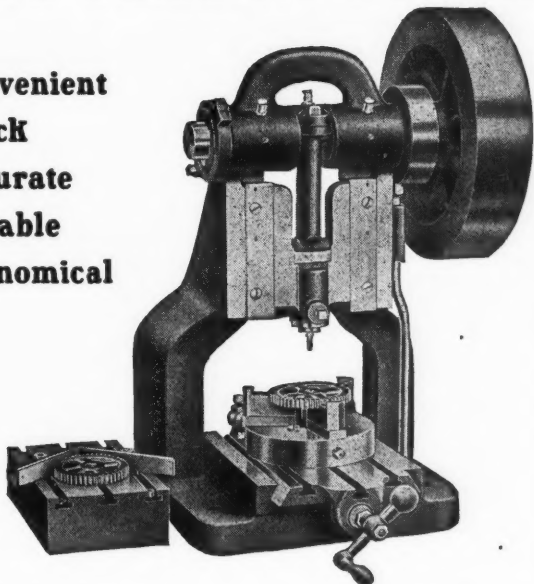


No. 3 High Speed Drill

Fox Machine Co.
815-825 North Front St.
Grand Rapids, Michigan

KEY-SEATING PUNCH

**Convenient
Quick
Accurate
Durable
Economical**



Has $1\frac{1}{2}$ inch stroke and will cut key-ways from $\frac{1}{8}$ inch up to $\frac{3}{8}$ inch wide.

Equipped with sliding table and sub-table with V block. Countershaft is also supplied, and we are prepared to furnish a suitable pedestal if required, also chuck for holding work. This is a very handy tool for light work in shops having internal key seating to do.

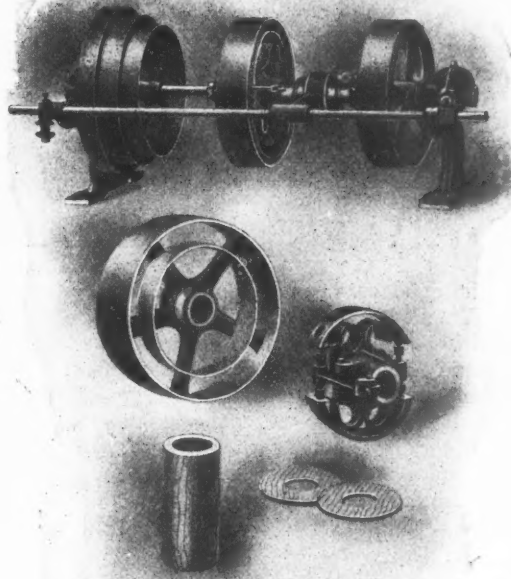
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European Branch, 149 Queen Victoria St., London, E. C.

"Arguto"

TRADE MARK
"Reg. U. S. Pat. Of."



Clutch Pulley Equipment
(PATENTED)

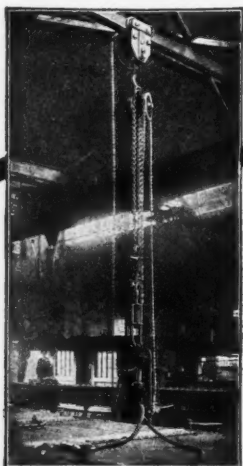
If you are sick and refuse the medicine that will help you, even your friends will soon lose patience. If you are wasting time and money through trouble with loose pulleys and friction clutches, if your belts are being slowly but surely ruined with the oil these same pulleys throw off as soon as speed gets up, if your floors and walls are oil-soaked—increasing the fire risk—goods damaged by oil stains, if one man's time is almost completely needed to look after the oiling of the pulleys—you are entitled to sympathy, but only until you can procure the remedy for all these ills.

Arguto Oilless Bearings

straighten out the loose pulley troubles in short order. They need no oil, no attention. Keep the center of a loose pulley running at highest speed cool and free from friction, are noiseless, durable—the right thing in the right place, and we can promise prompt delivery.

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Arguto Oilless Bearing Co.
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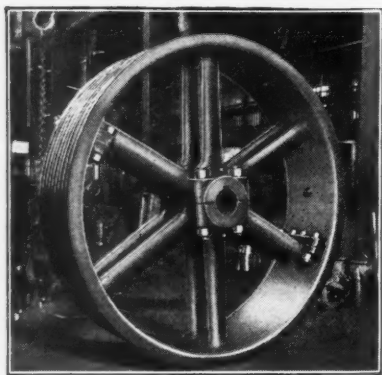
The Very Science of Hoisting

is condensed and embodied in the Yale & Towne Triplex Block. It out-lifts, outlasts, outclasses in speed, ease and safety any other style of chain block made. It is adapted for every kind of hoisting—in the machine shop, the railroad shop, the factory, the foundry; wherever heavy loads must be handled the "Triplex" is needed.

Send for Catalogue.

The Yale & Towne Mfg. Company
9-15 Murray Street,
New York.

Power-Transmitting Machinery



We manufacture and install complete rope drives. Our machine-molded sheaves are perfect in balance, accurately finished and free from flaws injurious to the rope. Rope drives de-

signed by us are successful. Poor design means failure.

We cast and finish Sheaves—all sizes—English or American system, Pulleys, Band Wheels, Fly Wheels, Gears, Sprocket Wheels, etc. We manufacture Shafting, Pillow Blocks, Hangers, Floor Stands, Elevating and Conveying Machinery, etc.

Headquarters for Supplies.

H. W. Caldwell & Son Co.

Chicago, Western Ave., 17th-18th St.

New York, 95 Liberty Street.

Woodward, Wight & Co., Ltd., New Orleans.

It Requires Less Power

to operate the

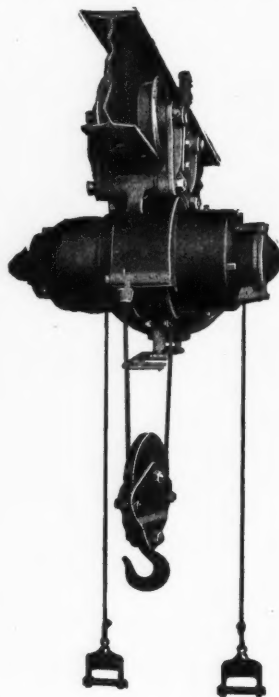
SHEPARD ELECTRIC HOIST

than any worm driven hoist.

SPUR GEARS

running in a bath of oil give it the highest efficiency, and all the essentials of the hoisting apparatus of the Modern Traveling Crane are combined in this simple and compact machine.

All parts enclosed but easily accessible; wide speed variation.

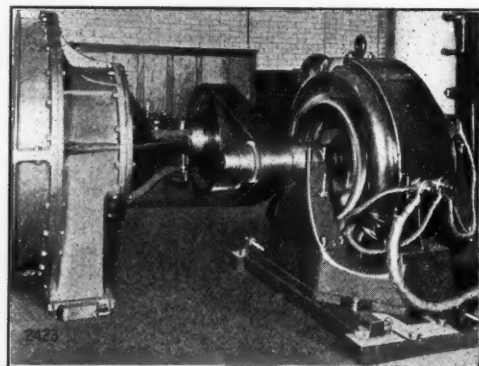


Bulletin No. 56 gives full description.

The General Pneumatic Tool Co.
Montour Falls, N. Y.

New York, 149 Broadway.

Philadelphia, Stephen Girard Bldg.



Renold Silent Chain

Photographed when operating at Full Speed

*on H. P. drive to blower, at R. H. Macy & Co.'s Store
New York City*

The clean-cut curves and non-slipping action shown in the picture are secured by the use of Spring Center Wheels, which absorb the pulsations of the engine and correct variations of angular velocity.

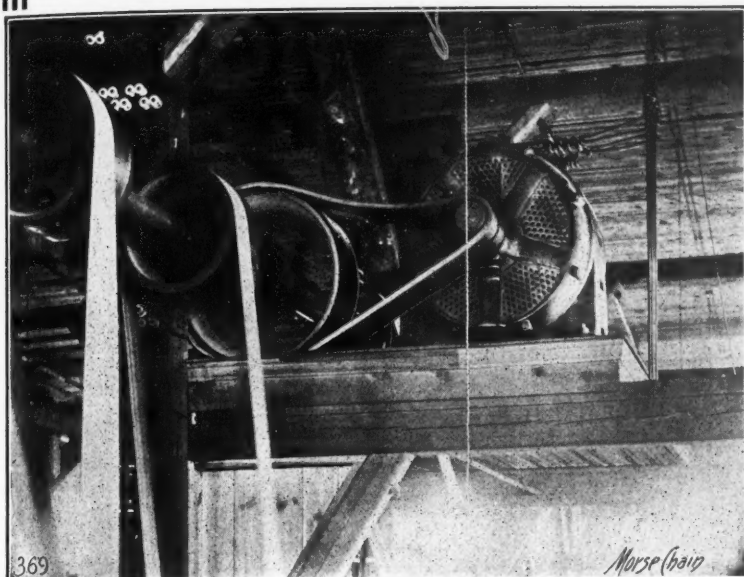
New Circulars 50 and 51 add new experiences to the information contained in Booklet "Y." All three for the asking. Write today.

New York
49 Dey St.
Chicago

LINK-BELT ENGINEERING CO.
PHILADELPHIA
LINK-BELT MACHINERY CO.

Pittsburg
Park Bldg.
Chicago

It Takes a Morse to Stop the Loss



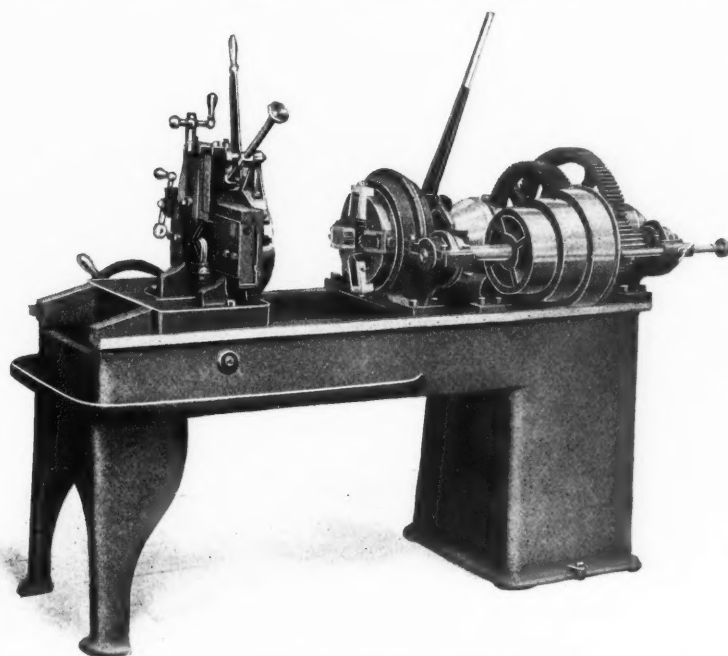
that occurs in transmitting power by means of belts or gears. The

Morse Rocker Joint Chain

will transmit power more cheaply because it can save enough to pay for itself in a year. Saves floor space on account of the short centers on which it can be run. The rocker joint obviates the need of joint lubrication, minimizes joint wear, prevents stretching. For any power, any speed. Morse book No. 7 tells the story fully.

The Morse Chain Company, Trumansburg, N. Y.

PEERLESS DIE-QUICK CHUCK- P. D. Q. C. PIPE MACHINES



When you can buy a machine like this at about the same price as a plain universal chucking machine that you have to stop every time you cut a thread, don't you think you had better put in a P. D. Q. C.?

We build them in three sizes:

P. D. Q. C. No 2 Capacity $\frac{1}{4}$ " to 2".

P. D. Q. C. No 3 Capacity $\frac{1}{4}$ " to 3".

P. D. Q. C. No. 4 Capacity 1" to 4".

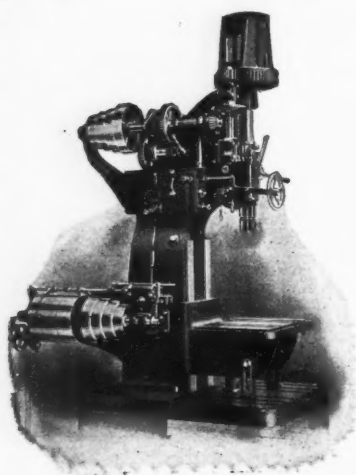
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Bignall & Keeler Mfg. Co., - - Edwardsville, Ill.

WE MAKE Hammered Steel and Iron Forgings

WRITE US FOR PRICES AND PARTICULARS
OUR WORK IS GUARANTEED

ERIE FORGE COMPANY, ERIE, PA., U. S. A.



YOU BUY THE BEST

When you buy our Tapping Machine for pipe fittings and flanges, with geared feed corresponding to lead of tap and automatic air shifting device for belts.

We also build a fine line of

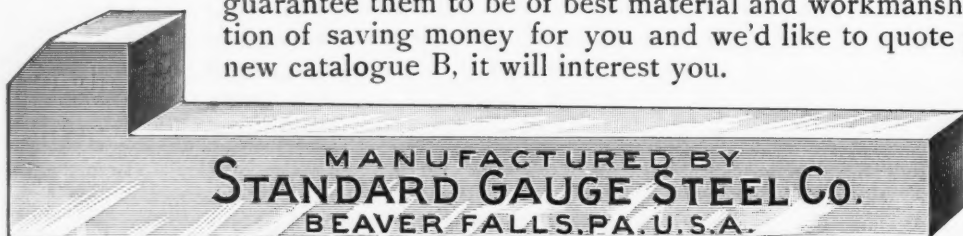
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Drilling and Boring Machines for Heavy Work,
Car Wheel Boreers,
Heavy Double Rod Drills,
Draw Stroke Slotters,
Universal Saw Benches.**

Baker Brothers, Toledo, Ohio, U. S. A.

AGENTS: Marshall & Huschart Mch. Co., Chicago, Ill. Motch & Merryweather Mch. Co., Cleveland, O. Brentiss Tool and Supply Co., New York City. Baird Mch. Co., Pittsburg, Pa. Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, Barcelona. Chas. Churchill & Co., London, Manchester.

It Would Keep You Hustling

To make Machine Keys in your own plant that would in any way equal ours or cost as little. Our Machine Keys are fitted ready to drive. They require no filing or fitting. We make them to your specifications and guarantee them to be of best material and workmanship. It's really a question of saving money for you and we'd like to quote prices. Send for our new catalogue B, it will interest you.



MANUFACTURED BY
STANDARD GAUGE STEEL CO.
BEAVER FALLS, PA. U. S. A.

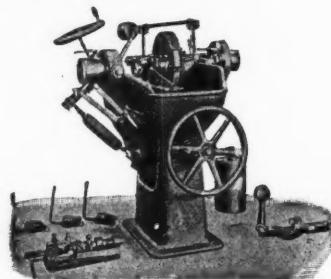
We also make Machine Rack, any length that we can conveniently ship.

William Sellers & Co. Incorp. Philadelphia, Pa.

Modern Machine Tools

Our TOOL GRINDING AND SHAPING MACHINES will accurately and quickly do all work after forging to finish tools to shape. The No. 1 size is capable for tools with $2\frac{1}{2}$ in. by 2 in. shanks (or 3 in. square if desired,) while the capacity of the No. 2, shown in the cut, is 2 in. x $1\frac{1}{2}$ in.

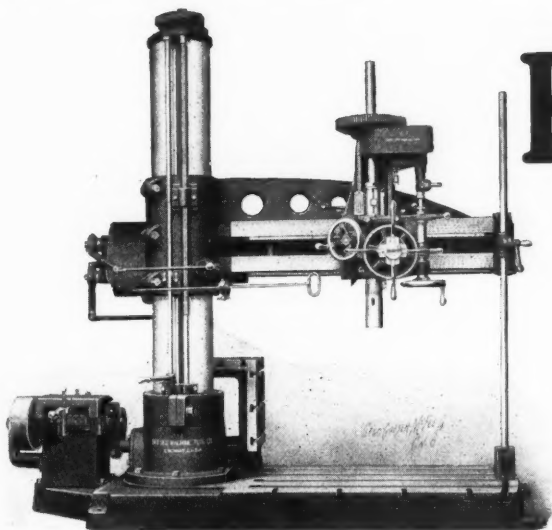
These machines will save time and money for the user, and we invite investigation of their advantages.



In the most convenient place

are all operation handles on our

Radial Drills



With the operator's left on the head-moving hand wheel and his right on the arm handle, a compound movement for quick location of the drill is performed.

This is another of the **advantages** not to be found in any other radial.

We make all sizes and styles. **Belt, Motor and Speed Variator** driven.

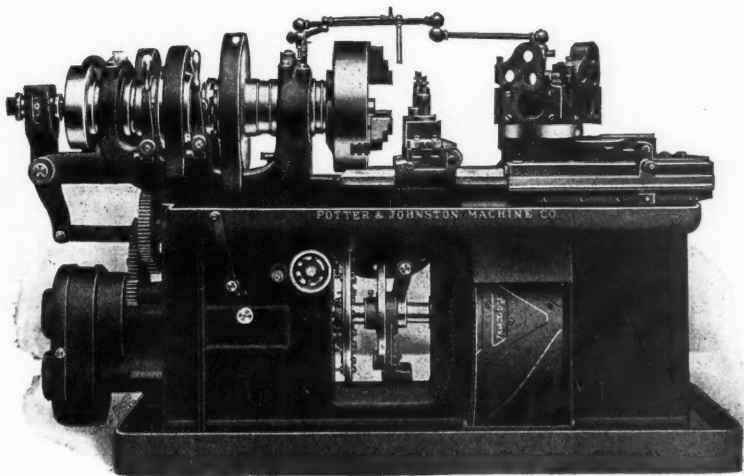
All adapted for the **high speed tool steel**.

**Two lines: STANDARD, highly developed.
SIMPLEX, plain, to meet all requirements.**

DRESES MACHINE TOOL CO., Cincinnati, Ohio

REPRESENTATIVES—Manning, Maxwell & Moore, Inc., New York, Philadelphia, Boston and Chicago. Carey Mch. & Supply Co., Baltimore. Baird Mch. Co., Pittsburg. Wm. C. Johnson & Sons Mch. Co., St. Louis. The Strong, Carlisle & Hammond Co., Cleveland. Pacific Tool & Supply Co., San Francisco and Hawaiian Islands. Selig, Sonenthal & Co., London. C. Schinz, St. Petersburg. G. Koepfen & Co., Moscow. V. Lowener, Copenhagen and Stockholm. Van Rietschoten & Houwens, Rotterdam. With. Sonesson & Co., Malmö, Sweden. Stussi & Zweifel, Milan, Italy.

You "Auto" Investigate the Merits of the Potter & Johnston Auto



7 x 14 Manufacturing Automatic Chucking Machine

Heavily geared automatic change speed head, change gear feed, cross slide, heavy 18-inch scroll chuck, automatic back facing attachment, oil pump, piping, oiling arrangement through turret for long hole drilling, oil pan base.

The machine which is accomplishing things in this world of manufacture; the machine which is cutting costs in half in some of the most progressive shops throughout the United States and Europe; the machine which is being operated in groups of four to eight by

ONE ATTENDANT.

For duplicate castings from iron, bronze or steel, also forgings and bar work of large diameter.

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When Seeking Quality and High Efficiency

COMBINED WITH

SYMMETRY of DESIGN

BEAR IN MIND THAT

PAWLING & HARNISCHFEGER

Milwaukee, Wisconsin,

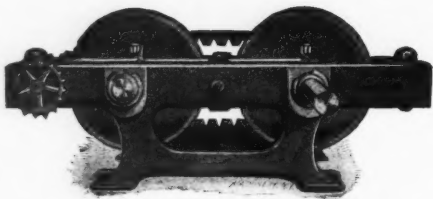
BUILD

**ELECTRIC TRAVELING CRANES
TRAVELING ELECTRIC HOISTS**

AND

**Horizontal Drilling and Boring Machines
THAT FULFILL THESE SPECIFICATIONS**

Reeves Variable Speed Transmission



Equips your machines to meet every speed demanded for modern work. High speed, low speed and every between speed instantly obtainable without stopping the machine or shifting a belt. It's a time saver, a money saver, and applicable to all classes of machines requiring variable speed.

Built in sizes to suit all conditions.

Book for the asking.

REEVES PULLEY COMPANY, Columbus, Ind., U. S. A.

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105

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NORTHERN CRANES

NORTHERN ENGINEERING WORKS
DETROIT MICHIGAN - U.S.A.
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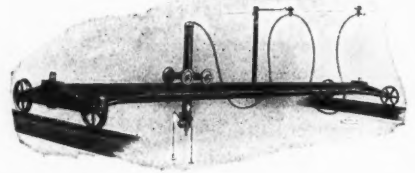
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ALL KINDS OF CRANES
Any Power.
ELECTRIC AND AIR HOISTS.
Catalogue free.

THE CURTIS Light Bridge Crane with Curtis Air Hoists



AIR HOISTS IN STOCK

PNEUMATIC ELEVATORS

AIR COMPRESSORS

Curtis & Co. Mfg. Co., St. Louis

AGENTS: Walter H. Foster, New York. Hill, Clarke & Co., Boston. Baird Machinery Co., Pittsburg. Strong, Carlisle & Hammond, Cleveland.



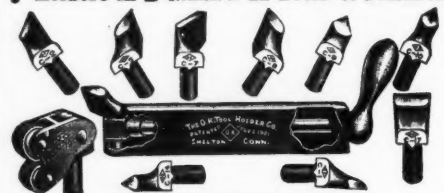
You get more hard service out of a Philips Pressed Steel Pulley than from a dozen ordinary pulleys put in one

The "Philips" is built for strength, to withstand strain, and for long wear. Its construction is a perfect blend of science and practice. All parts are interlocked, making the pulley practically one piece from the massive hub to the light but strong rim.

Write us for details, we make a full line of sizes.

Philips Pressed Steel Pulley Works,
Fourth St. and Glenwood Ave.
Philadelphia, Pa.

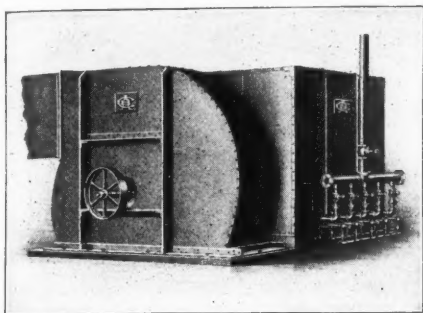
7 Holders in 1 with an assortment of 22 Tools & Fixtures



Catalog and particulars sent on request.

O. K. Tool Holder Co., Shelton, Conn., U. S. A.

"A B C" Fan System of Heating and Ventilating



The Ideal Method for Manufactories.

"Has been in operation during the whole of the winter and at no time has it given us a particle of trouble in any way."
A. L. IDE & SONS, Springfield, Ill.

"This apparatus has operated in the most satisfactory manner from the day it was started, we having had absolutely no trouble of any sort."
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"The distribution of heat has been as nearly uniform as possible, keeping the buildings in a comfortable condition throughout the coldest days of the winter."
TOLEDO, (O.) WIRE AND IRON WORKS.

"It is the most economical as well as the most satisfactory manner of heating and ventilating that we are aware of."
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MAY WE HAVE YOUR PROBLEM?

American Blower Company, Detroit

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Established 1874

"The House of Quality and Service."

MANUFACTURERS

**"Everything you need
in your Foundry."**

The S. Obermayer Company

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Send for General Catalogue No. N 40.

Buy the Trimo

GOLD MEDAL
ST. LOUIS, 1904

Here are a few good reasons
for so doing.

The jaws are drop-forged from the best steel, and carefully tempered and tested before leaving the works.

No need to waste time and money resharping the teeth—when dull, the inserted jaw can be quickly and cheaply replaced.

Material and workmanship are of the best throughout. We guarantee every TRIMO tool in all respects, and stand by our guarantee.

Lastly, prices are right.

Let us hear from you. Or ask your dealer.

Trimont Mfg. Co.,

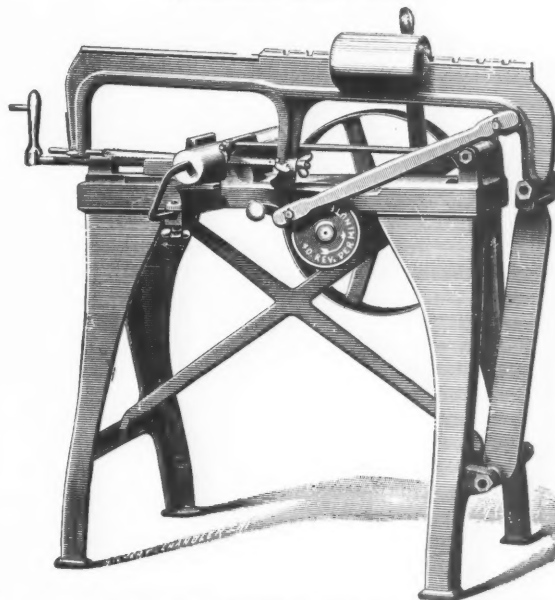
Dept. Roxbury, Mass.



Hoefer Power Metal Saw

Steady and uniform pressure on saw on the entire forward stroke, with pressure relieved on return stroke. Saw lifts automatically at the end of cut.

THOUSANDS IN USE.



We also manufacture Drill Presses, Horizontal Drilling and Boring Machines, Vertical Boring Machines, Wire Straighteners, Furniture and Bed Spring Machinery.

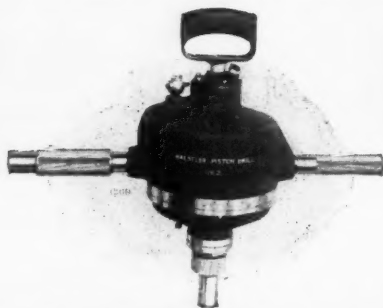
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Hoefer Mfg. Co., Cor. Chicago and Jackson Sts., Freeport, Ill.

FOREIGN AGENTS: C. W. Burton, Griffiths & Co., London, England; Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg; Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao, J. Lambercier & Co., Geneva, Switzerland.

AIR

FOR DRILLING,
REAMING, TAPPING,
FLUE EXPANDING,
BORING, ETC.



DRILLS

Superior in design, material and workmanship. A three cylinder, balanced, reciprocating piston motor with no vibration at any speed. A single valve controlling admission and exhaust to all three cylinders.

THE INCERSOLL-SERGEANT DRILL CO.

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K13

AIR COMPRESSORS

BELTED - DIRECT CONNECTED - HAND - POWER
SINGLE AND THREE CYLINDER STYLES.

Capacities 1 to 30 cubic feet free air per minute.

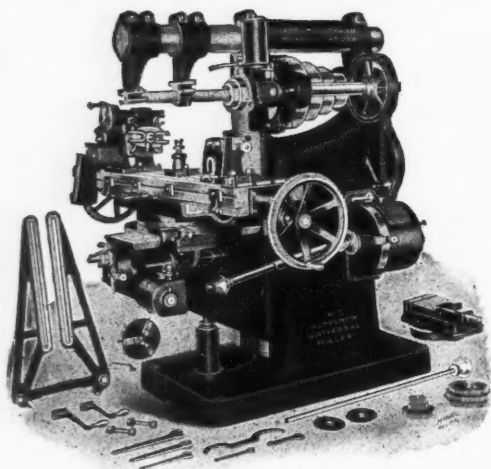
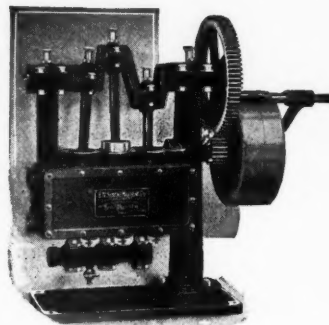
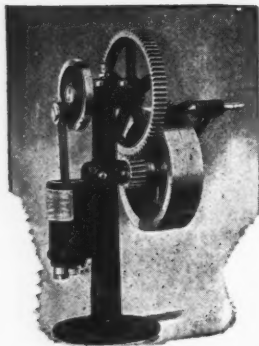
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THE F. W. SPACKE MACHINE CO.

INDIANAPOLIS, IND., U. S. A.

GEAR CUTTING

We maintain a special department for this division of our business. Let us furnish estimates.



No. 3 Universal Miller. All feeds positive and automatic.

THE KEMPSMITH MILLER

—the type of what is best in design and reliable in workmanship, in milling machine construction. New and modern throughout, with late improvements increasing its working qualities.

Catalog is just out and is of value, if interested.

THE KEMPSMITH MFG. COMPANY Milwaukee, Wis., U. S. A.

EUROPEAN AGENTS: Selig Sonnenthal & Co., London, E. C.
AGENTS FOR HOLLAND: R. S. Stokvis & Zonen, Rotterdam.

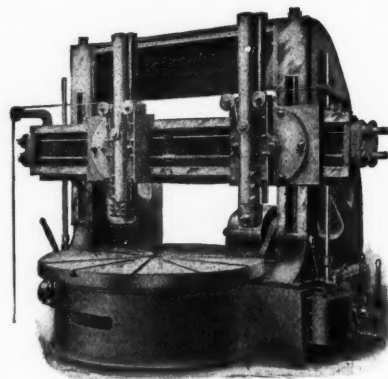
Poole Boring Mills for Heavy Work

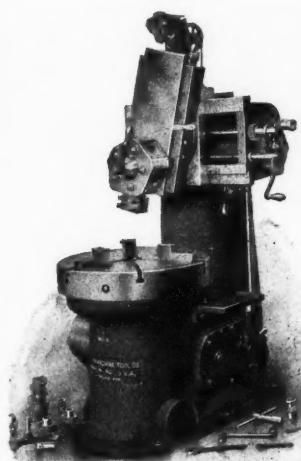
Exceptionally strong and rigid; ample weight given to all parts; adapted to make the most efficient use of high speed steels. Every improvement for convenient operation. The cone pulley is mounted between the housings on these machines, making them particularly compact; all gears are enclosed. Belt or motor drive as desired.

Built in 6, 7, 8 and 10 ft. sizes. Write for Bulletins.

The J. Morton Poole Co., Wilmington, Del.

AGENTS—Prentiss Tool and Supply Co., 115 Liberty St., New York, 145 Oliver St., Boston, 507 D. S. Morgan Bldg., Buffalo. Hill, Clarke & Co., Chicago. W. C. Johnson & Sons Mch. Co., St. Louis. Tatum & Bowen, San Francisco.





COLBURN BORING MILLS

Are attractive business like looking tools viewed from any point.

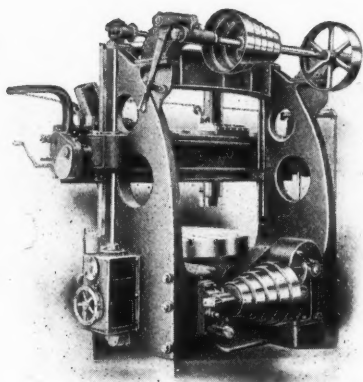
They are work producers and money savers.

If you are interested in high speed rapid production work write us for full information.

Built in following sizes:

30", 34", 42", 44", 53", 60" 72".

Colburn Machine Tool Co.
FRANKLIN, PA.



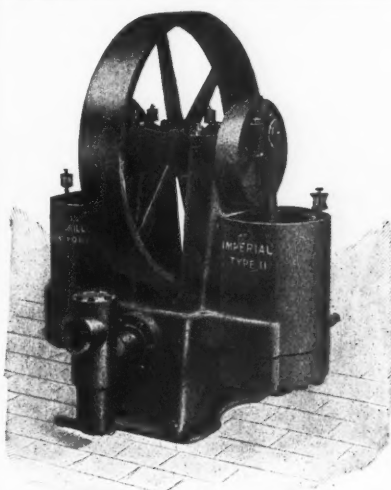
PATTERN MAKERS' LATHES

OUR NEW CATALOG
will interest every one who uses tools of
this class and we shall be glad to send a
copy free on request. Your name please!

FAY & SCOTT
DEXTER, MAINE

RAND DRILL CO.

128 BROADWAY
N.Y.



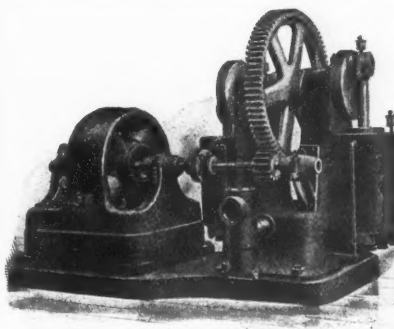
Rand "Imperial" Type 11 Compressors

The "Imperial", Type 11 Compressor is especially adapted for use in machine shops, foundries and other industrial establishments where but little attention can be given to a compressor.

All high pressure Type 11 compressors are fitted with "Imperial" unloaders, which automatically prevent compression when air is not required.

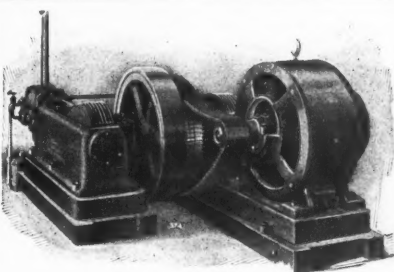
We also furnish this compressor to be driven by various motors through gears and silent chains.

More fully described in Catalog "I."



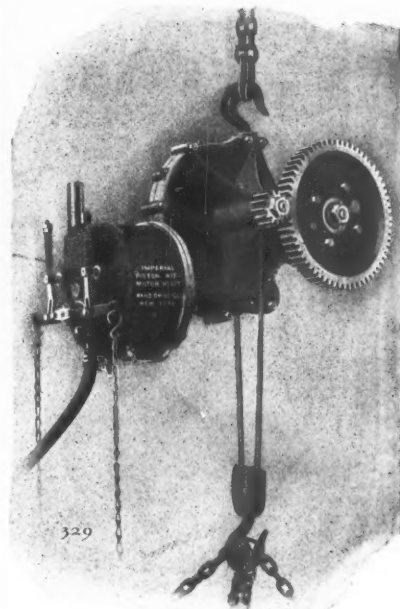
"Imperial" Type 11 Compressor

Geared to Electric Motor.



"Imperial" Type 10 Compressor

Noiseless Chain Drive, Electric Driven.



"Imperial" Pneumatic Hoists

Built in all sizes and capacities.
Fully described in Circular No. 18.

PRICES
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TERMS
on
Request.

Have you seen
"Air Power?"

The Williams Electric Clutch and Safety Device

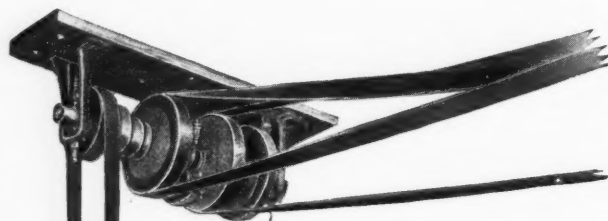
Gives absolute control over machinery in every part of the factory. The entire plant may be instantly shut down, or any department started or stopped independently of the others. It is a saver of time, power, needless wear and tear on belts and shafts, and is a safeguard against accident to men or machines.

24-inch Engine Lathe

equipped with

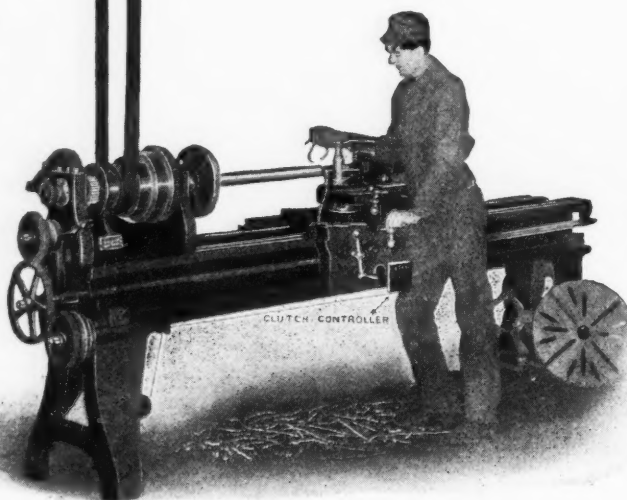
Williams Electric Counter-shaft

Any machine so driven may be stopped instantly or gradually at the will of operator.



This Electric Clutch is neat and compact in design and perfectly reliable. It is applicable to the heaviest as well as the lightest service, and particularly useful when it is desirable to start or stop the power frequently, in fact there is no limit to its usefulness.

May we send you catalogue?



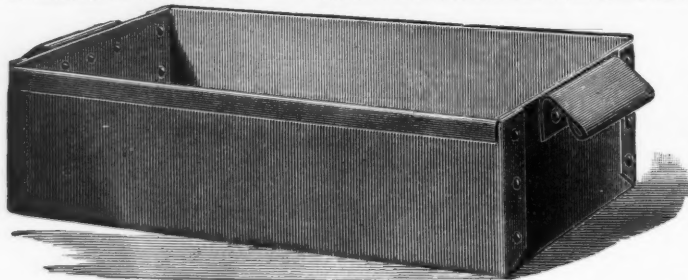
The Williams Electric Machine Co., Akron, Ohio

Also manufacturers of Lifting Magnets, Electric and Mechanical Clutches.

Pressed Steel Shop Pans or Tote Boxes

For Machine Shops and Foundries, Bolt Works, Etc.

THOUSANDS IN USE. DURABILITY AND SATISFACTION GUARANTEED.



Size "K" No. 16 Gauge.

Suitable for handling bolts, rivets, nails, screws, nuts, washers, castings, ore, quartz and other substances, and for use under lathes and drill presses to catch the turnings, trimmings, borings, oil drippings, etc. Send for Catalogue.

KILBOURNE & JACOBS MFG. CO., COLUMBUS, OHIO.

Made of any Gauge of Sheet Steel desired; never go to pieces as the common riveted boxes do, and always give entire satisfaction. Try samples and you would not be without them in your works at any price.

These Saws Stand the Test

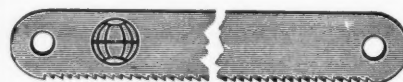


The proper way to test Hack Saw Blades is to cut off pieces from the same bar of steel, changing the blades to be tested on each alternate cut. Keep an accurate record of the time consumed by each blade in performing the work and the number of cuts each blade makes. If the weight or pressure on the blade is changed it should be made so as to effect both saws alike. This is the kind of test we solicit for the

Universal Hack Saw Blades.

We only ask a fair trial and if we cannot then convince even the most hardened unbeliever that our blades are all we claim for them—we have nothing more to say.

Your dealer will furnish them on your order. Send for circulars and prices.



West Haven Manufacturing Company,

NEW HAVEN, CONN., U. S. A.

Sole Agents for Export,
The Fairbanks Co., Broome and Elm Sts.,
New York.

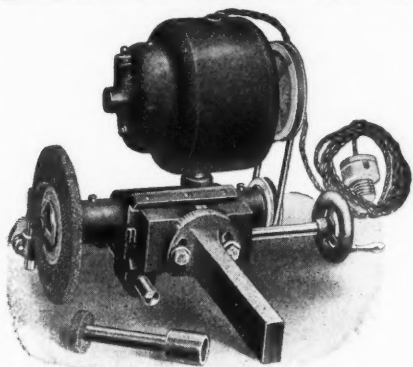
78-80 City Road, London, E. C., Eng.

As one of our customers said the other day of the

AMERICAN GRINDING ATTACHMENT

"It is so handy; you can take it anywhere."

And he ought to know.



It is always ready for **A HURRY CALL** to sharpen a dull reamer or milling cutter that won't cut, grind down a hardened arbor without annealing, grind out the hole in some bushing or cutter as may be required, in fact do a dozen jobs of the same character that arise every day and which would require hours when done on a universal machine. *You lose nothing by asking us for particulars and it may save you dollars.*

The Heald Machine Company
Station D-2, WORCESTER, MASS.



The Taylor-Newbold Saw

Cuts easily a .35 carbon forging 9" by 14" in 17 minutes.

Inserted cutters treated by the Taylor-White Process under exclusive rights.

30 cutters in 36" Saw may be changed in 12 minutes.

A set of cutters hardly dulled in two weeks' continuous cutting night and day.

Actual test on motor driven machines shows **three times the amount of work with the same power** as required on tempered blades.

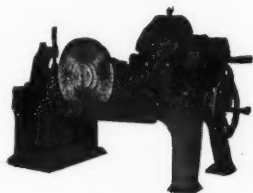
THE TABOR MFG. CO.

18th & Hamilton Sts., Philadelphia, Pa.

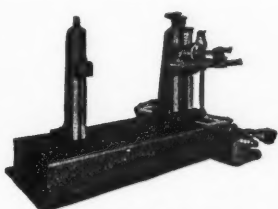
30-32 S. Canal St., Chicago, Ill.

84 Mason Bldg., Boston, Mass.

49, Deansgate, Manchester England.



PATENTS PENDING
No. 3 Bar Cold Saw



No. 2 Horizontal Floor Boring
Milling and Drilling Machine



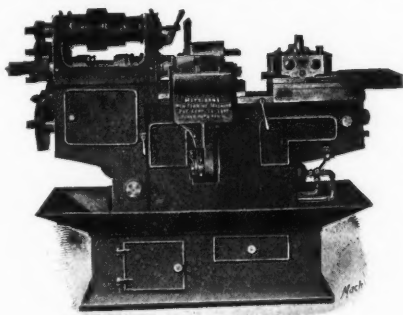
PATENTS PENDING
No. 2 I Beam Cold Saw

WRITE FOR CATALOG

ESPEN-LUCAS MACHINE WORKS

Broad and Noble Sts., Philadelphia, Pa.

THE NEW FORMING MACHINE.

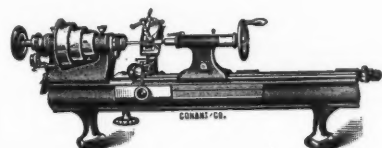


MULTIPLE SPINDLE. FULL AUTOMATIC
For all kinds of screw machine work

This machine is built in the most accurate manner—of the best materials to do the most work in the least time. It requires but a few minutes to make the changes for different sizes, either in length or diameter, of parts made of tool or mild steel or brass, and requires no expensive box tools for any ordinary work. Has automatic changes of spindle speed and feed both of turret and side cutters, and is not dependent on spindles for the accuracy of cut.

It will produce from two to four times more work than any single spindle machine.

James D. Mattison, 253 Broadway
New York, U. S. A.



Precision Lathes.

Also full line of attachments for same.

Send for catalogue.

STARK TOOL COMPANY,
WALTHAM, MASS.

STERLING

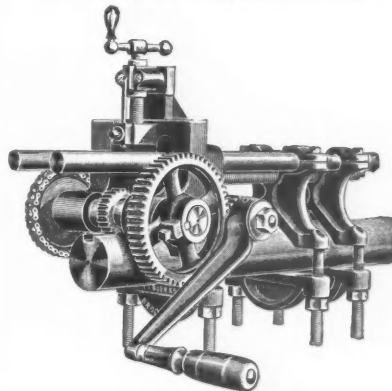
Blades That Cut
Straight

are the kind you get in "Sterling" Hack Saws. The best grade Tool steel uniformly tempered is responsible for their lasting satisfaction. They are used by the best workmen on the most exacting work. Not so high in price as you might suppose. Samples free. Write for prices.

DIAMOND SAW & STAMPING WORKS, BUFFALO, N. Y., U. S. A.

Your Repair Shop

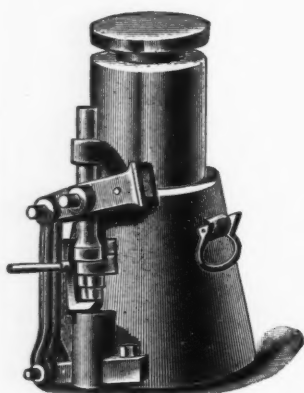
is not complete unless equipped with one of these **Burr Keyseaters**



They cut perfect keyseats in shafting anywhere. Save time, delays and money. No. 1 keyseats shafts to 5 in. diameter. Price, with full set of cutters, \$40.00 net. No. 2 takes shafts to 8 in. Price, with cutters, \$75.00 net.

Interesting booklet free.

JOHN T. BURR & SONS, 34 South 6th St.
BROOKLYN, N. Y.
Selig, Sonnenthal & Co., London.



CHICAGO OFFICE,
453 ROOKERY.

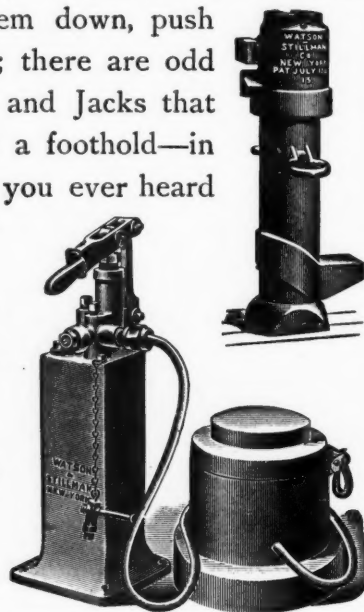
There are Jacks and Jacks, but a Watson-Stillman Hydraulic Jack is what you need—

and there is one for *every* need, 257 styles and innumerable sizes. We can "jack" things up, "jack" them down, push them sideways, pull them lengthways; there are odd little Jacks for unget-at-able corners, and Jacks that can be worked where there's hardly a foothold—in fact we make most every kind of Jack you ever heard of and some special styles you'd hardly know the use of.

We have a separate catalogue for Jacks, we'll send it if you are interested.

**The Watson-Stillman
Company.**

46 Dey Street, New York, U. S. A.



Special Hinge Riveter

10" Gap.
22" Reach.

Universal Bale will
work in any position.
The machine you
want for field work
and riveting Shoe
Plates on columns.

Made in several
sizes.

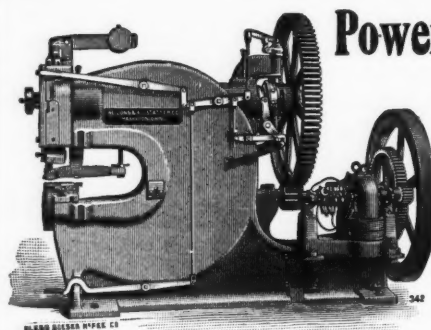
Send us your
inquiries.

Catalogue M
will
interest you.



PEDRICK & AYER CO.
PLAINFIELD, N. J.

Manufacturers of Cranes, Air Hoists and Special Tools



**Power Punching
and
Shearing
Machines**

Belt, Steam and
Electrically
driven.

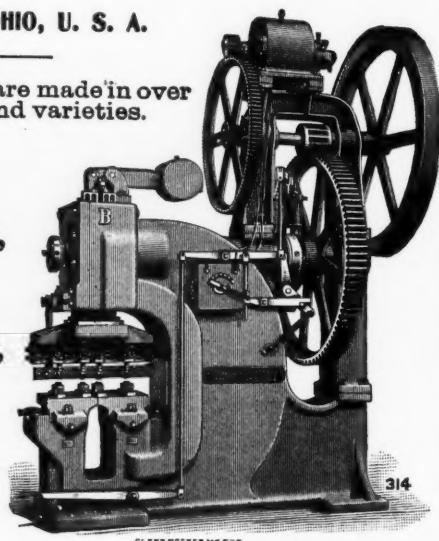
LONG & ALLSTATTER CO.

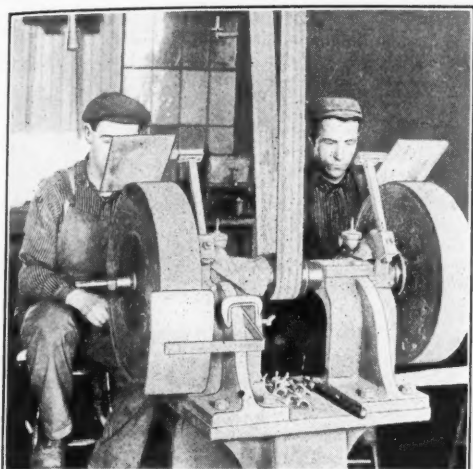
HAMILTON, OHIO, U. S. A.

Our machines are made in over
350 sizes and varieties.

SINGLE,
DOUBLE,
UPRIGHT,
HORIZONTAL,
GATE,
MULTIPLE,
FOR

Railroad Shops,
Locomotive Shops,
Bridge Works,
Etc.





GILMER ENDLESS BELTS AND BELTING

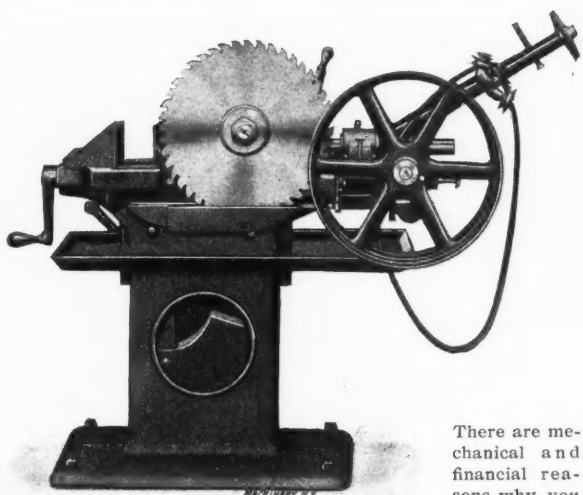
THE BELT FOR HOT AND DRY PLACES

25 per cent. better service is worth considering—this is the record of a Gilmer Woven Belt used on a polishing wheel, as against any single leather belt previously employed in the same service. The polishing machine being in a very dry place the leather belts soon cracked and fell victims to dry rot. Gilmer Belts are not affected by heat, damp, grease or other untoward conditions.

These belts will slip less and pull more for a given width than any belt made and will outwear others twice over. Woven endless or joined with our special belt hooks.

Write for Circulars.

L. H. GILMER & COMPANY, Philadelphia, Pa.

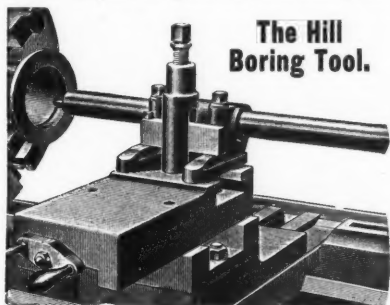


There are mechanical and financial reasons why you should use the

Hill Automatic Cold Saw Cutting-off Machine.

Our book tells all about it. If you are good we will send you a machine and prove it.

We will send you one of these boring tools let you use it for thirty days and if it is not the best you ever saw or used you may keep it without charge.

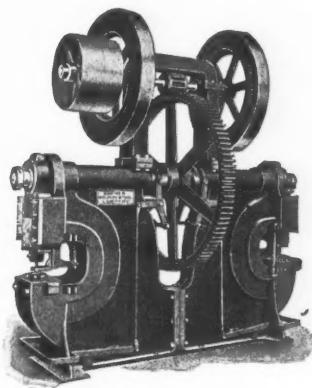


HILL-STANDARD MFG. CO., Anderson, Ind., U. S. A.

We make a Specialty of

Punching and Shearing Machines

SINGLE AND DOUBLE.



Our machines have hammered steel shafts. Material and workmanship throughout, the best that money can buy.

These machines are suitable for Railroad Shops, Bridge Shops, Structural Iron Works, etc.

Send for bulletins.

The C. E. Sutton Co., Toledo, Ohio, U.S.A.

Are you interested in the Best

PUNCH AND SHEAR?

Then ask us about the

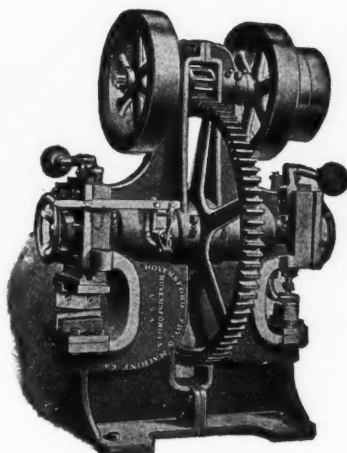
ROYERSFORD

BUILT FOR SERVICE.

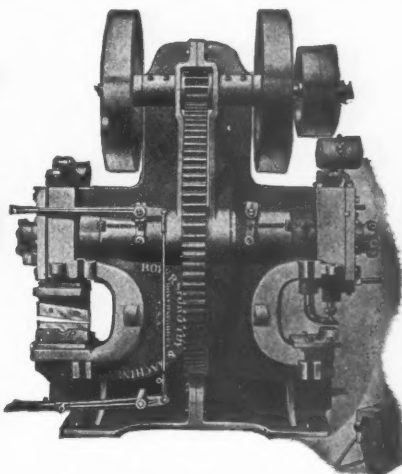
VARIOUS SIZES. REQUIRES LITTLE FLOOR SPACE.

ROYERSFORD FOUNDRY AND MACHINE COMPANY,

ROYERSFORD, PA.

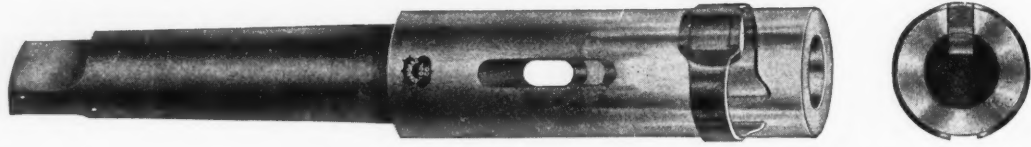


No. 1 Automatic



No. 3 Heavy Duty, 12 in. Throats

The Standard Tool Co.'s



Pitkin Grip Socket

Simple
and
Inexpensive



Strong
and
Durable

For Securely Holding Taper Shank Drills

If the tangs are destroyed, the sockets or shanks damaged so that the taper fit will not hold or the service is exceptionally severe, buy the Pitkin Socket.

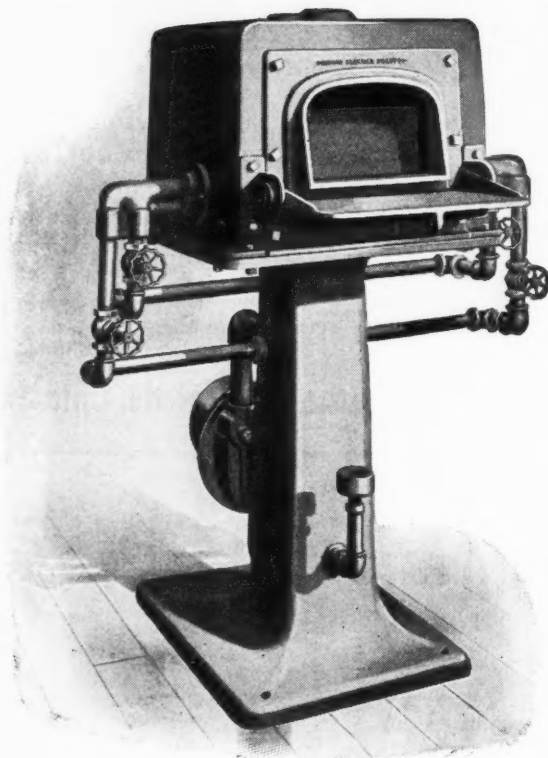


No Cams, Collars or other parts to go wrong

Send for descriptive Circular No. 1-S.

Eastern Salesroom,
94 Reade St., New York

Office and Factory,
CLEVELAND, O.



They Never Come Back

There isn't a case on record of anybody sending back a Stewart Gas Blast Furnace once he has tried it and found out its advantages.

There's a Reason

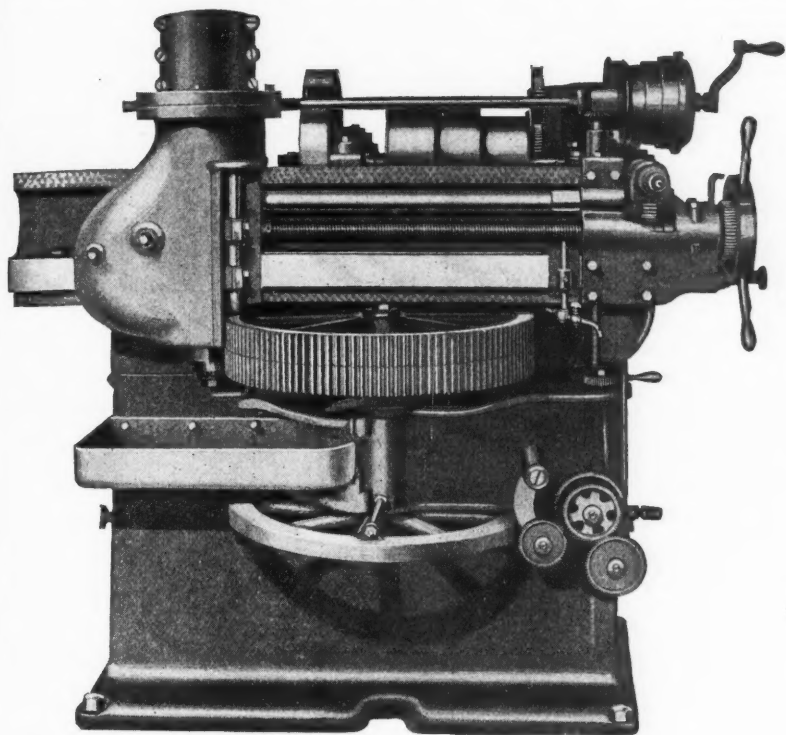
The "Stewart" heats high grade steel with absolute evenness, the temperature is at all times under perfect control, results are certain, the work is done in half the time and the furnace requires only a fraction of the care demanded by other methods. Makes no dust or ashes, can be set up any where and costs but a few cents an hour for gas.

We make 55 styles and sizes, and shall be glad to send you a suitable furnace on trial. Have you seen our new Catalogue?

Chicago Flexible Shaft Co., 149 La Salle Ave., Chicago, Ill.

FOREIGN AGENCIES—Niles Tool Works, 23-25 Victoria St., S. W., London. Fenwick Freres, 8 Rue de Rocroy, Paris, France, Agents for France, Italy, Belgium, Spain, Portugal, Switzerland.

Let Us Help You Reduce the Cost of Your Gears.



Compare Gear Shaper time with your present methods and your order will be ours. This has been our usual experience, especially where quality was concerned.

REMEMBER the Gear Shaper shows a saving of 25 to 50 per cent. in cutting time, and produces smooth running gears.

REMEMBER a generating cutter is used, only one being required for each pitch.

REMEMBER the Gear Shaper will plane internal and cluster gears with but little clearance under the teeth.

REMEMBER our Gear Cutting Department is at your service.

Send us prints for Gear Shaper time even though you are not in the market.

THE FELLOWS GEAR SHAPER COMPANY, 23 Pearl St., Springfield, Vermont, U.S.A.


FOREIGN AGENTS—Henry Kelley & Co., Manchester, England. M. Koyemann, Dusseldorf, Germany. Ph. Bonvillain, Paris, France. White, Child & Beney, Vienna, Austria. Walter S. Stone & Co., Yokohama, Japan.

Don't Lose Your Temper!

The Goodell-Pratt Hack-Saws never do. They are too well tempered for that. Tempered in the most approved way. Made from the finest quality of hot-rolled sheet steel. Sharpened and set by a peculiar process of our own. They cut easily and rapidly. Last long.



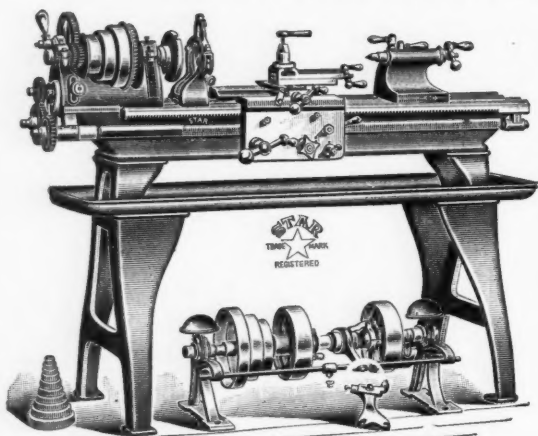
What other qualities can you ask for in a Hack-Saw? No other Hack-Saw contains so many good qualities as you will find in the Goodell-Pratt.

Always look for this mark  on a Hack-Saw. It's like an insurance policy. It assures you that it was made by the celebrated

GOODELL-PRATT COMPANY,
GREENFIELD, MASS., U. S. A.

A "Star" Lathe

MOUNTED ON OIL-PAN



makes the finest kind of a lathe for the model-maker, gunsmith, electrical and repair work, and fine, accurate machine-shop, tool-room and laboratory service, where precision, convenience and durability are essential. Prices are moderate. Sizes 9, 11, 12, 14, 16 inch swing. We also make Bench Lathes, Foot Lathes, Speed Lathes, Wood Turning Lathes.

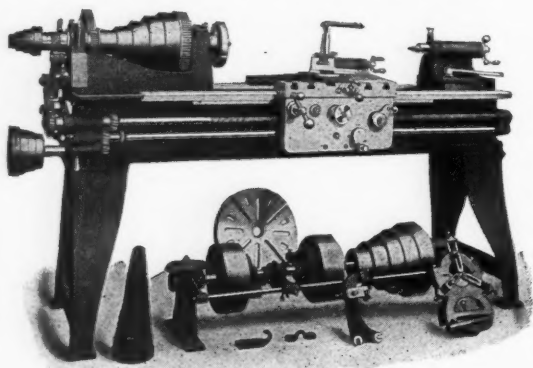
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The Seneca Falls Mfg. Co.

330 Water Street, Seneca Falls, N. Y., U. S. A.

85A

We Make Lathes a Specialty



Write for description of

New 15-inch Engine Lathe
with
Instantaneous Change Gear Device

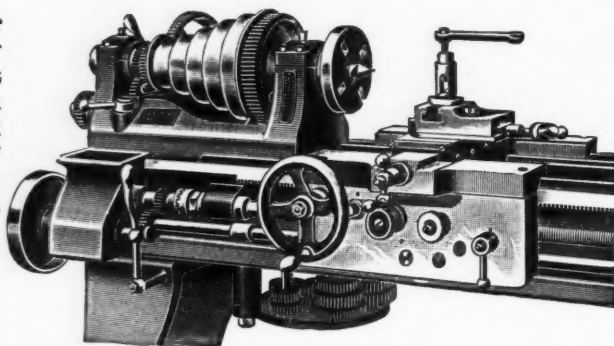
This improved tool will interest you

Von Wyck Machine Tool Co., Cincinnati, O.

The New Model Flather Lathes

Are the tools for modern work. They are built to turn out accurate work in quick time; have all the good points of lathe construction, and are made in sizes from 14-inch to 30-inch swing.

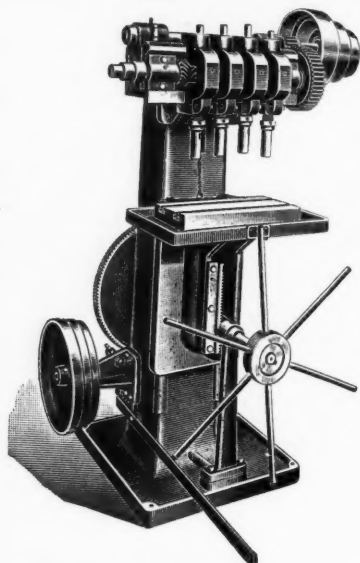
Our Catalogue will be sent on request.



Flather & Co., Inc., Nashua, N. H., U. S. A.

AGENTS—Hill, Clarke & Co., Boston, New York and Chicago. Chas. Churchill & Co., London, Birmingham, Manchester, Glasgow. Alfred Herbert, Ltd., Paris. V. Lowener, Copenhagen, Stockholm, Christiania.

Spiral Geared Gang Drills



Efficient Durable Convenient

Spindles are driven by spiral gears which mesh into a spiral gear running entire length of head, permitting any adjustment of spindles without reference to drive. The No. 5 drill, shown above, has capacity up to $\frac{3}{8}$ " drills, $\frac{1}{2}$ " apart with single spiral, and $\frac{1}{4}$ " with double spiral.

Write for new Catalogue.

MOLINE TOOL COMPANY, Moline, Ill.

OUR SPECIALTY,

Automatic Machinery
for making **Wood Screws.**

Asa S. Cook Co., HARTFORD, CONN., U.S.A.

Second Hand Machine Tools

IN THE PLANT OF
CRESWELL & WATERS CO., Nicetown, Philadelphia.

Must be Sold at Once.

LATHES.

14x6 Plain, Johnson.	20x8 Plain, Harrington.
16x6 Plain, Harrington.	23x10 Plain, Thomas.
18x8 Plain, Harrington.	24x8 ft. 6 in. Plain, Harrington.
19x12 New, Harrington.	21-48x8 Gap, Harrington.
19x12 New, Johnson.	31 in. Putnam Pulley Lathe.

PLANERS.

16x16x3 New Haven.	36x36x9, 1 hd, New Haven.
22x22x6 Harrington.	36x36x9, 1 hd., Sellers.
24x24x7 New Haven.	42x42x9, 1 hd., Sellers.
25x25x7 Harrington.	
30x28x8, 2 hds., Harrington.	

DRILLS.

16 in. Sta. hd., Harrington.	24 in. Sll. hd., Wheeler.
20 in. Sta. hd., Prentice.	2 1/2 ft. Semi-Radial, Hilles & Jones.
22 in. Sll. hd., Kelly.	3 ft. Semi-Radial, Hilles & Jones.

MISCELLANEOUS.

No. 1 B. & S. Plain Screw Mach.	6 in. New Belt Lacing Mch. Diamond.
2x24 Trip G., Warner & Swasey.	Grinding Machines.
9 in. Traverse Hd., Shaper.	No. 6 Vertical Miller, New, B. B. Lincoln Miller, Bul-lard.
18 in. New Traverse Hd., Fitchburg.	Plain Miller, Garvin.
Detrick & H. New Motor Driven Floor Borer.	4 1/2 in. Cut Off Mch., Starr.
2 in. Bar Kelley Boring Mill.	4 in. Pipe Mch., Armstrong.
	Polishing Machines.

Send for complete list with prices.

Miscellaneous Department,
NILES-BEMENT-POND COMPANY,
111 Broadway, New York City



UNIT LINK BALL BEARING FLEXIBLE SHAFT

Is appreciated more and more every day.

Bring your tools to the work and save the labor of carrying heavy work to the tools.

1-10 H.P. or 150 H.P. all the same to us.

Motor equipment of all kinds for flexible transmission.

*"Tell us what you want; we'll tell
you what we have."*

Send for Bulletin 18-A.



Coates Clipper Manufacturing Company

Worcester, Massachusetts

London Office, 14 Thavies Inn, Holborn Circus

Single and Multiple Upright Drills

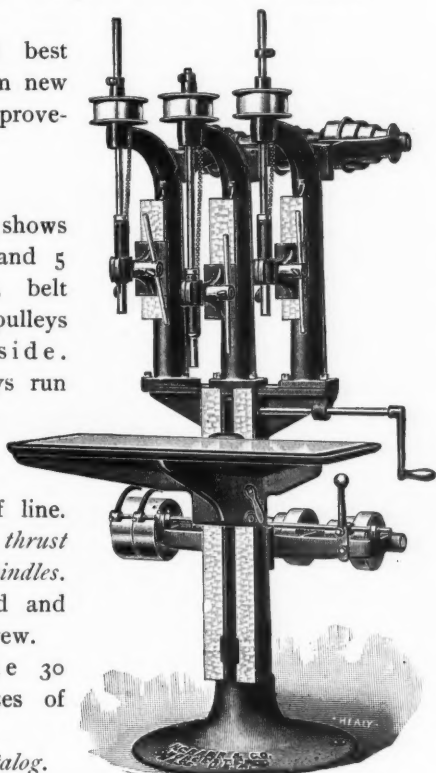
Noted for Rapid Work and Accuracy.

Built of best materials, from new designs, all improvements.

Engraving shows the 2, 3, 4 and 5 spindle style, belt driven. All pulleys turned inside. Spindle pulleys run on stationary sleeve and do not wear the spindle out of line. *Ball bearing thrust collars on all spindles.* Table raised and lowered by screw.

We make 30 styles and sizes of upright drills.

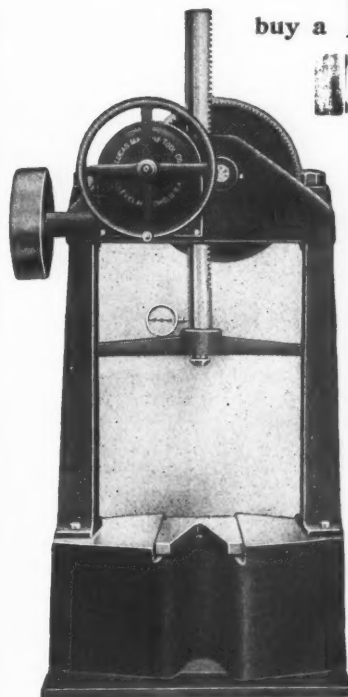
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H. G. BARR, WORCESTER, MASS.

DON'T BUY COAL but
save your money and

buy a **Lucas Power
Forcing Press**



The coal necessary for

ONE

"shrink fit" if put under the boiler, would furnish enough power to make

HUNDREDS

of

FORCE FITS

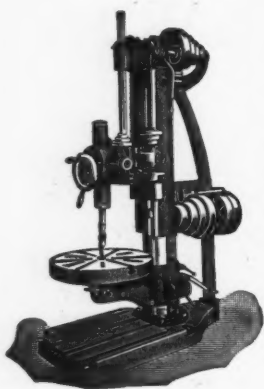
on our

PRESS.

You also save re-finishing and polishing, uncertainty (the gauge tells) and time.

Lucas Machine Tool Co.
Cleveland, Ohio, U. S. A.

AGENTS: Hill, Clarke & Co., Boston, Chicago. W. M. Pattison Machinery Co., Cleveland. Pacific Tool & Supply Co., San Francisco. C. W. Burton, Griffiths & Co., London.



Repeat Order for Quint Turret Drills

MR. A. E. QUINT, Hartford, Conn.

North Andover, Mass., April 14, 1905.

Dear Sir: You may enter our order for one four spindle Turret Drill and Reversing Tap Holder, as quoted, \$160.00; 10 days delivery. *We understand this machine to be substantially the same as those which we have bought of you before.*

Yours respectfully,

DAVIS & FURBER MACHINE CO.

The above well known firm have twelve Turret Drills of various sizes, some of them in constant use for the past ten years.

Turret Drills made in four sizes and with from four to twelve spindles for finishing holes at one setting in all kinds of machinery.

A. E. QUINT, Hartford, Conn.

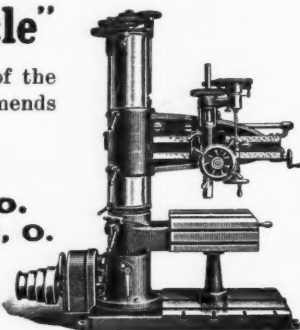
"Swinging Round the Circle"

The arm making a full circle is only one of the features of the **Mueller Radial Drill** that recommends it above similar machines—there are others.

Write us for book with full details.

Mueller Machine Tool Co.
216 W. Pearl St., CINCINNATI, O.

AGENTS: Niles-Bement-Pond Co., New York, Boston, Philadelphia, St. Louis and London, E. C., England. Pratt & Whitney Co., Chicago. Strong, Carlisle & Hammond Co., Cleveland, Ohio. Chas. G. Smith & Co., Pittsburg, Pa. Henshaw, Bulkley & Co., San Francisco and Hawaiian Islands.



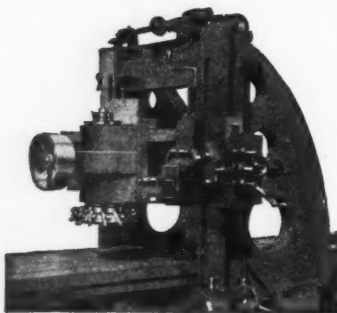
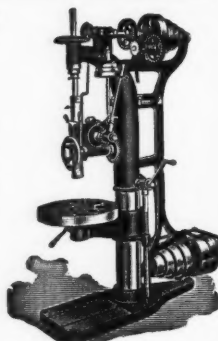
A Good Drill Press is a Tool of Many Uses.

A SIBLEY DRILL in your shop is rarely idle. With proper jigs these machines will accomplish a very large amount of work at a very low labor cost. They are rapid, accurate, have a wide range, are adapted for light or heavy work as occasion requires, and are fitted with all the latest improvements.

Write for Catalogue showing Styles and Sizes of Power Drills.

Sibley Machine Tool Co., South Bend, Ind.

Successors to Sibley & Ware.



Milling Machine

The Farwell Miller, built for Planers, will convert any planer into a combination tool on which milling, boring and planing can be done and at one setting of the work.

Means are provided for vertical, horizontal and angular positions of spindle.

It is built for four sizes.

Send for Catalogue No. 56.

THE ADAMS COMPANY
Dubuque, Iowa, U. S. A.

**YES,
WE
ALSO
MAKE
SMALL**



New Yankee Drill Grinders

WILMARTH & NORMAN CO.

155 Canal St.,
GRAND RAPIDS, MICH.

Stockbridge TWO-PIECE Crank Shapers

The Shapers that hustle. They can't help it, they are built that way.

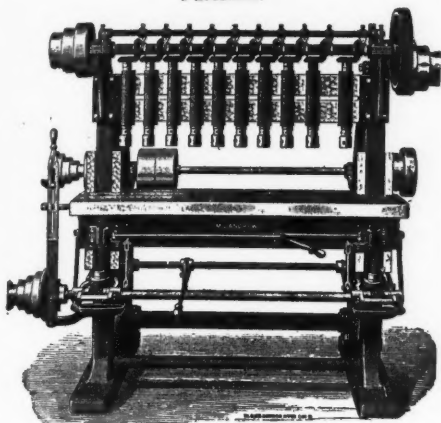
OUR NEW 20-INCH MUST BE SEEN TO BE APPRECIATED.
IT'S A PRODUCER.

HAVE A CIRCULAR?

STOCKBRIDGE MACHINE CO., WORCESTER, MASS., U.S.A.

The Andrew Multiple Drilling Machine

Patented.

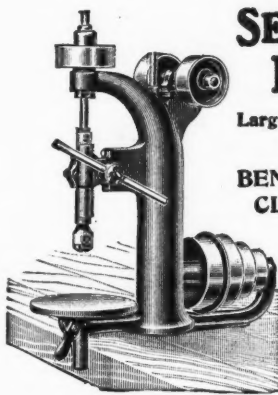


AN up-to date, labor saving tool for light or medium drilling, especially adapted for agricultural machinery. All spindles are adjustable and can be easily changed to different positions. Table has both hand and power feed and quick return stroke.

We build machines of any capacity from 1 to 50 spindles, to drill as close as $\frac{7}{8}$ " center to center, on a straight line, grouped in different forms or staggered.

May we send further details?

M. L. Andrew & Co.,
Cincinnati, Ohio.



SENSITIVE DRILLS

Large Line. Power or
Lever Feed.

BENCH DRILLS,
CLAMP DRILLS,
PLANER
CHUCKS.

**Francis
Reed Co.**
Worcester, Mass.

WE MANUFACTURE SHAPERS

EXCLUSIVELY.

12 TO 32 INCH STROKE.

SMITH & MILLS,
Cincinnati, Ohio, U. S. A.

Heavy Rocker Arms Large Main Gears Strong General Con- struction

are all points that
help to make

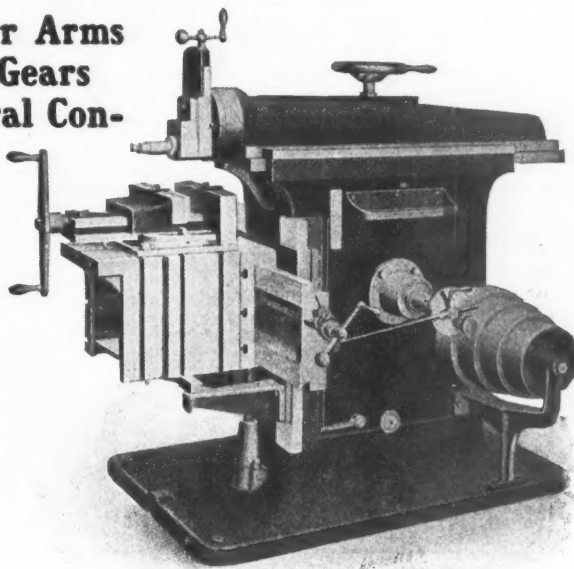
Kelly Shapers

the powerful, ac-
curate, efficient
machines they are
everywhere con-
ceded to be.

Crank Shapers Exclusively

15", 17", and 20"
Plain.

16", 20", 24" and 26" Back geared.



New Catalogue shows full line.

THE R. A. KELLY CO., - Xenia, Ohio

Rapidity, Accuracy, Durability and Ease of Operation

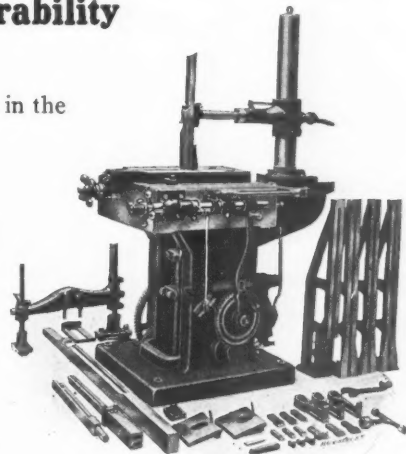
are the features most prominent in the

Morton Key Seater

It centers the work by the bore and can be set to cut a keyway of a given size and taper, without a rule and before it is placed on the machine. Built in sizes 8", 18", 24", 30" and 48" stroke.

Investigate the Morton.

MORTON MFG. COMPANY
Muskegon, Heights, Mich.

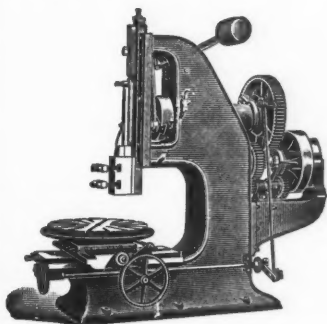


NEW HAVEN MFG. COMPANY,

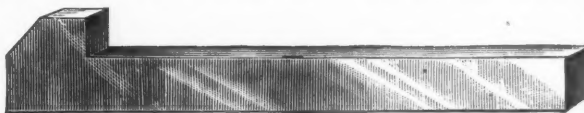
NEW HAVEN, CONN.

MANUFACTURERS OF

SLOTTERS, PLANERS,
LATHES, DRILLS,
ETC.



Finished Machine Keys



Cheaper than you can make them.

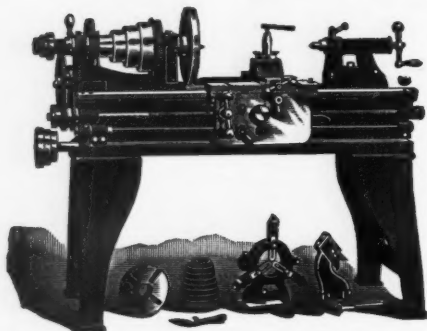
Finished "Ready to Drive."

Gib and Plain Head.

All sizes carried in stock.
Write for discounts.

OLNEY & WARRIN,
66-68 Centre St., New York.

For Small or Medium Work Try a Sebastian Lathe.

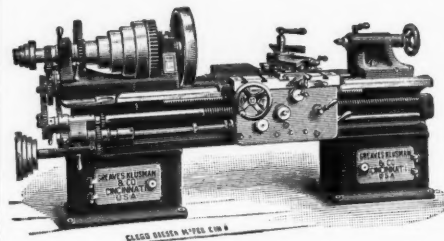


Fitted with all the latest time and labor saving improvements and adapted for the most accurate work. If your line of work is light manufacturing, this is the tool you need. Built in sizes from 13 in. to 15 in. swing; substantially constructed, carefully proportioned, convenient, economical.

CATALOGUE GIVES FULL DETAILS.

Sebastian Lathe Co., 129-131 Culvert St., Cincinnati, O.

Standard Engine Lathes



16 to 24 inch Swing

Built by

Greaves, Klusman & Co.

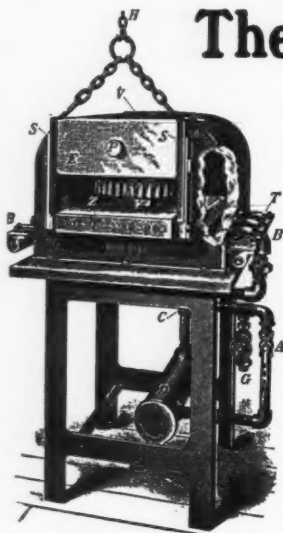
S. E. Cor. Cook & Alfred Sts.

CINCINNATI, OHIO, U. S. A.

Also Builders of

Pattern Makers' Lathes and Machinery and Metal Spinners' Lathes.

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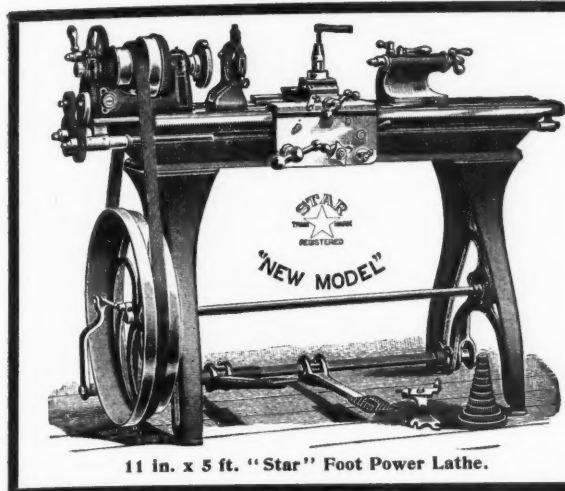
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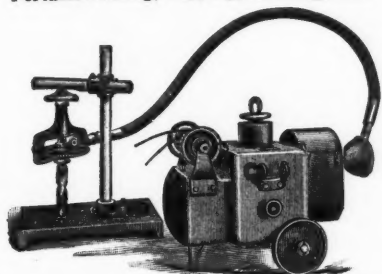
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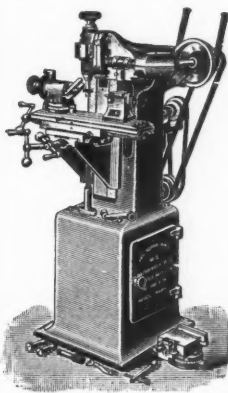
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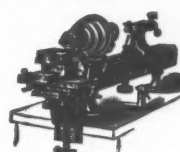
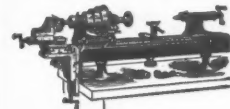
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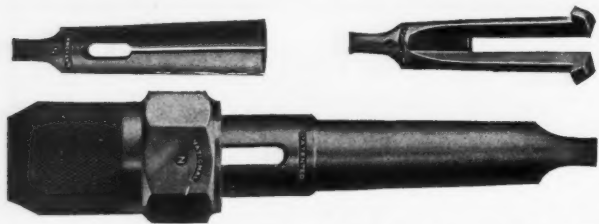
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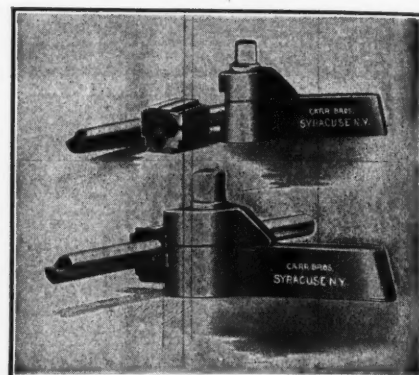
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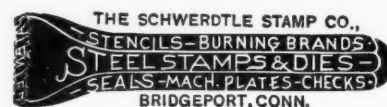
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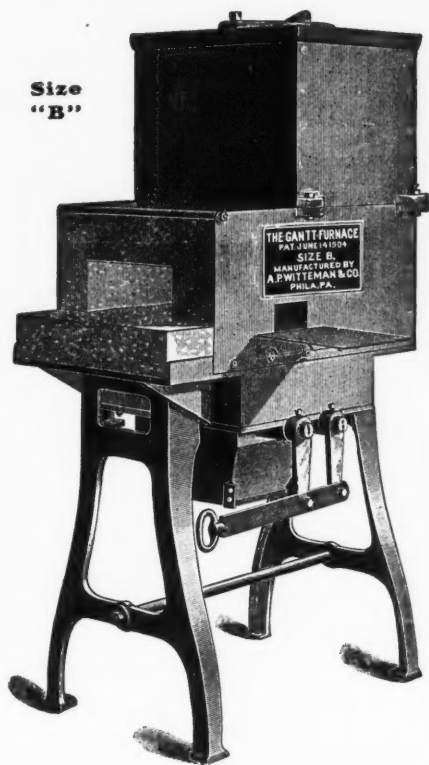
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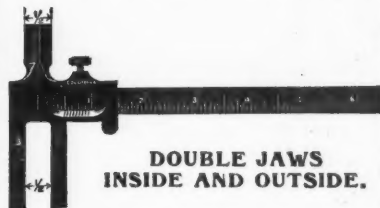
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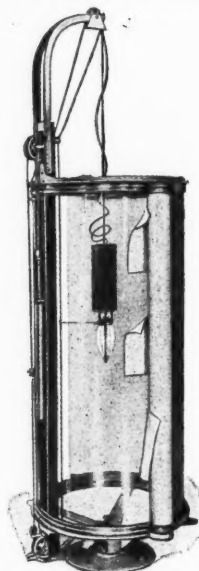
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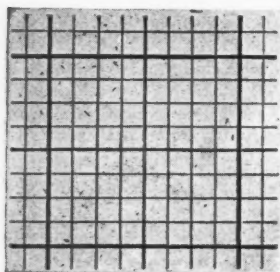
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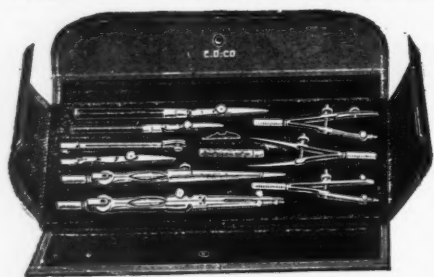
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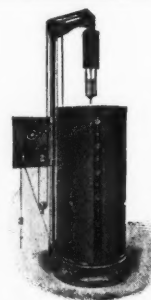
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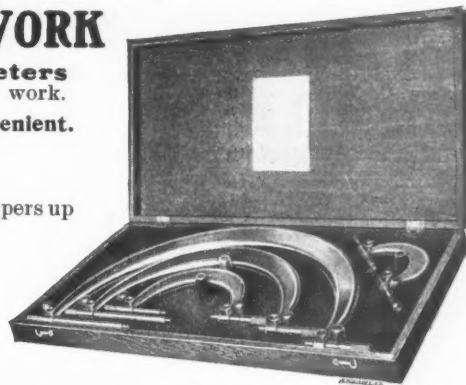
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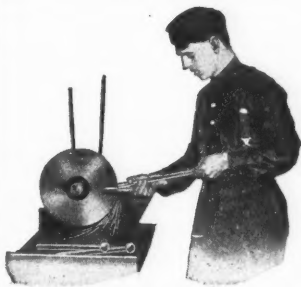
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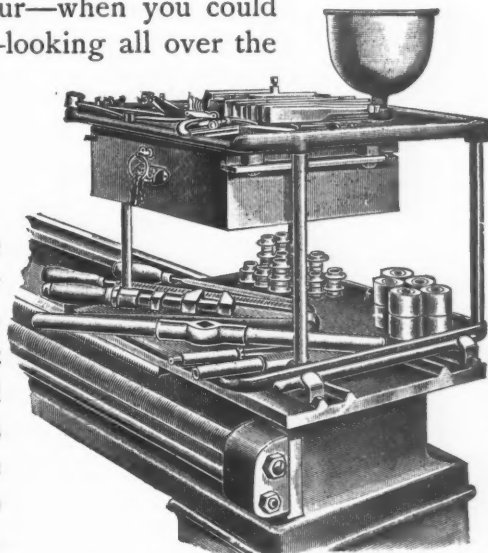
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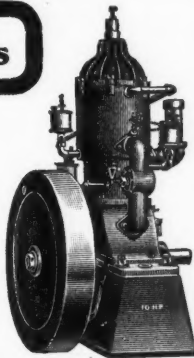
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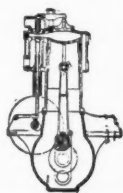
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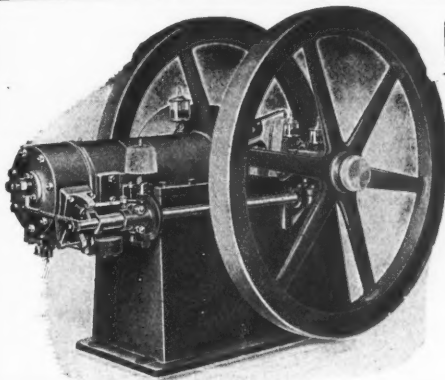
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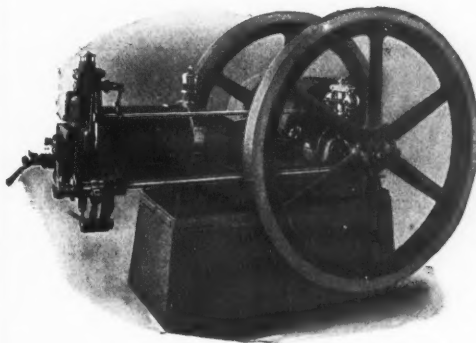
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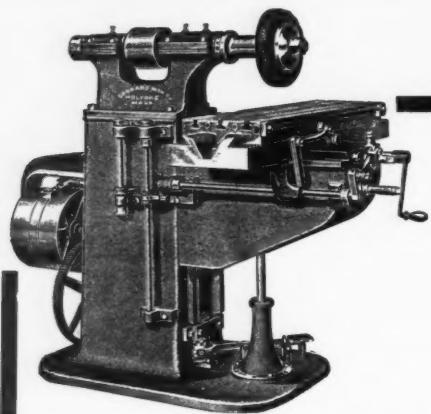
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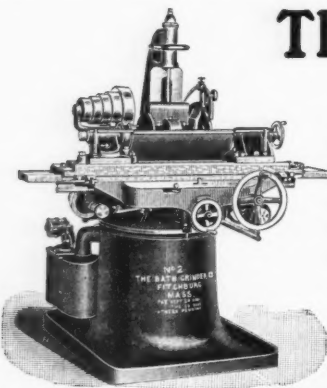
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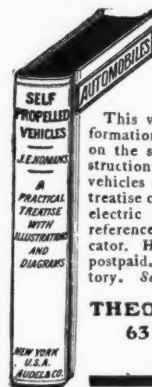
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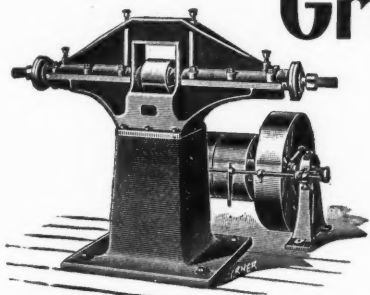
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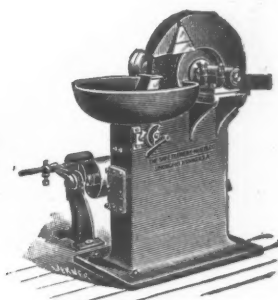
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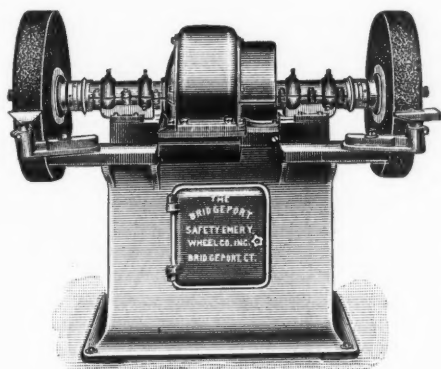
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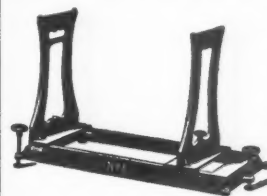
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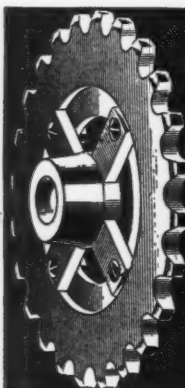
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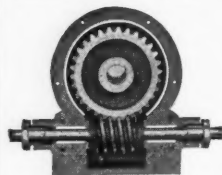
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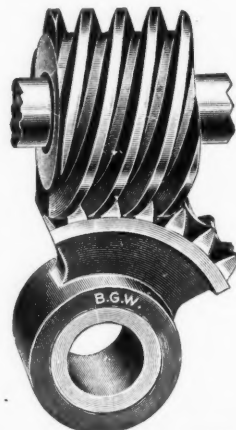
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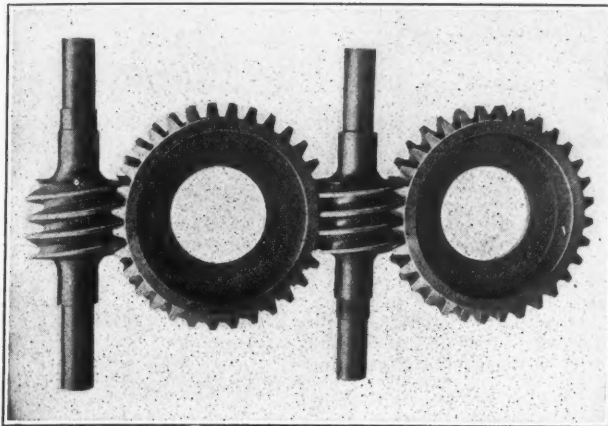
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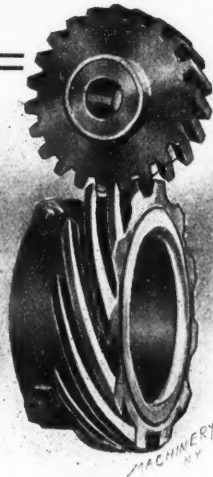
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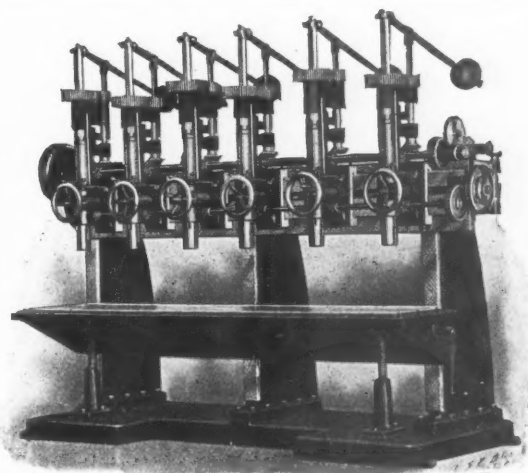
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If your floor space is limited but with good height, a Bradley Compact Hammer would prove a money maker.

It is compact in design, occupies but little space and can be run at high speed.

As it weighs considerably less than our regular Upright Hammer its price is much less.

Made with head weighing 15 to 200 pounds.

WE MAKE....

The Bradley Cushioned Helve Hammer.
The Bradley Upright Strap Hammer.
The Bradley Upright Helve Hammer.
The Bradley Compact Hammer.
Forges for Hard Coal or Coke.

SEND FOR CIRCULARS

C. C. Bradley & Son, Syracuse, N. Y.

FOREIGN AGENTS: Schuchardt & Schütte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schütte, Cologne, Brussels, Liège, Paris, Milan, Bilbao. Buck & Hickman, Whitechapel Road, London.

BUY "American Pioneer" Pressed Steel Shaft Hangers

and you **SAVE MONEY**

Because

They are cheaper than any other—and the cost of putting them up is more than cut in half—so is the freight.

Made in the following sizes:

1 1/8 to 3 1/2 in. diameter. 8 to 24 in. drop.

Sold by supply houses throughout the United States and Canada.

Manufactured by

Standard Pressed Steel Co.,
20th and Clearfield Sts., Philadelphia, Pa.



Rigid

Light

Unbreak-
able

Handy

Low List

High

Discount



Open.

"KEYSTONE" CONNECTING LINKS

(PATENTED)

FORCED FROM BAR STEEL

Out-Pulls and Out-Wears Wrought Chain of Equal Size.

1/8 Inch Link Pulled 14,800 lbs. Under Test. Sizes from 1/4 to 1 inch

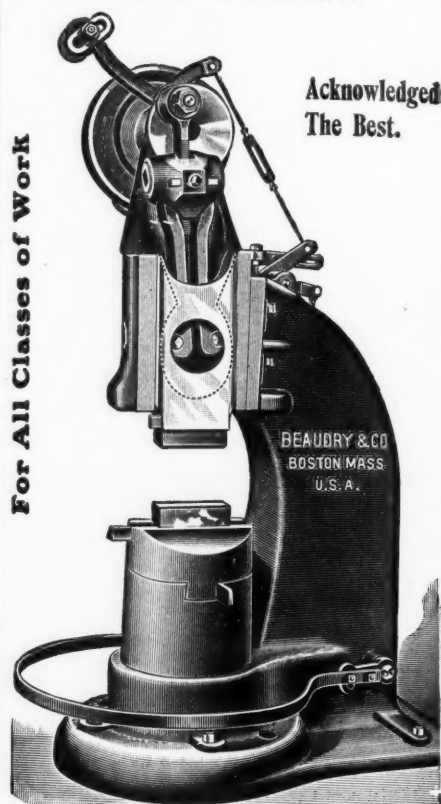
Write for Catalogue and Discounts.

KEYSTONE DROP FORGE WORKS
CHESTER, PA., U. S. A.



Shut.

The Beaudry Champion Power Hammer.

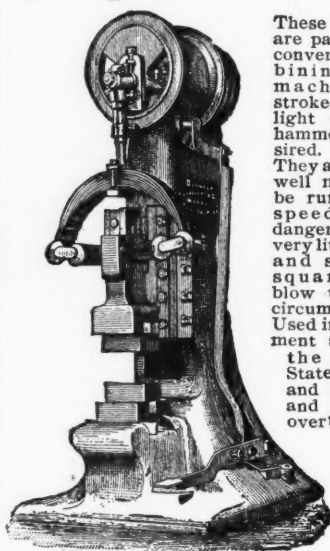


Acknowledged
The Best.

For All Classes of Work

BEAUDRY & CO.,
141 Milk Street, Boston, Mass.

Spring Power Hammers



These hammers are particularly convenient combining in one machine the stroke of a very light or heavy hammer as desired.

They are strong, well made, can be run at high speed without danger, require very little power and strike a square, true blow under all circumstances. Used in government shops by the United States, France and Russia, and sold all over the world.

DIENELT & EISENHARDT, Inc.

1304 No. Howard Street
PHILADELPHIA, PA., U. S. A.

DROP FORGINGS

SEND FOR ESTIMATES

The E. D. Clapp Mfg. Co.

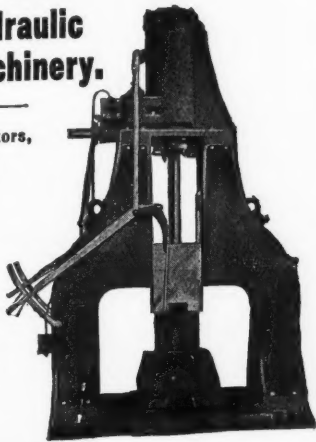
Auburn, N. Y.

Established 1864.

Steam Hammers AND Hydraulic Machinery.

Accumulators,
Riveters,
Cranes,
Presses.

Send
for
Catalog.



HAMMERS of all sizes and for all classes of work. Double and single frame. Made with **STEEL FRAMES** for severe service.

Chambersburg Engineering Co.,
Chambersburg, Pa.



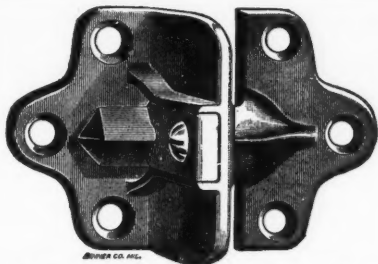
Scranton Power Hammers

COST LESS than any other hammer that will produce an **EQUAL AMOUNT OF WORK.**

By our construction we avoid break-downs.

Send for Circular 37.

**The Scranton
& Co.**
New
Haven,
Conn.



Frazer's Adjustable Mal- leable Iron Flask Pin

saves time, expense, and makes true castings. Quickly applied and easily adjusted.

Send for prices on our line of Pat-
tern Makers' Specialties.

MILWAUKEE FOUNDRY SUPPLY CO.
Milwaukee, Wis.

More than 1 000 Sets

of dies and all very active
in the manufacture of
Drop-forgings for Machine
Shop uses.

Book "B" for complete line.

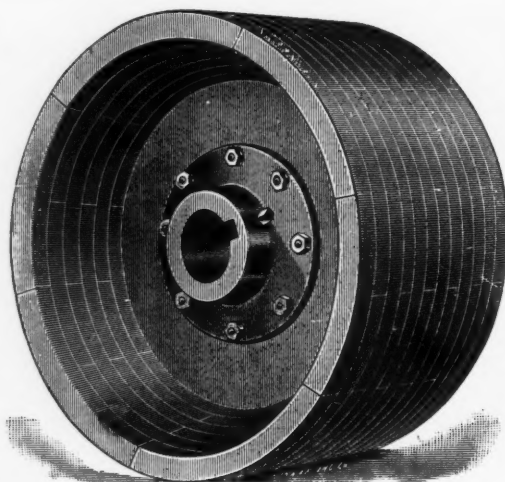


Stocks carried in
Chicago
and
Brooklyn-New York

J. H. Williams & Co.
Drop-forgings only

For Dynamos, Trip Hammers or other Heavy Work.

We manufacture a solid web pulley especially adapted for extremely severe service and guarantee that it will do the work specified, no matter how heavy. Style D. built of selected, thoroughly seasoned maple, having an iron center fitted with key seat and set screw, is the lightest, strongest, stiffest and best finished Dynamo Pulley on the market.



STYLE D. SPECIAL PULLEY.

The Gilbert Wood Split Pulleys are universally acknowledged to be as perfect, both in material and construction, as it is possible to make them, and can be used successfully wherever a belt can be operated. Excel all others in correctness of balance and trueness of running.

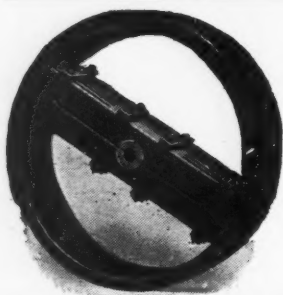
Write for illustrated catalogue and price list.

Saginaw Manufacturing Co.

Saginaw, W. S. Michigan.

SALES AGENCIES IN ALL THE PRINCIPAL CITIES IN THE WORLD.

New York Branch, 44 Dey St. Phone 187 Cortlandt. Chicago Branch, 35 South Canal St. Cable Address, Engrave. A.B.C. and Lieber's Codes.



BUCKEYE Wood Split PULLEYS

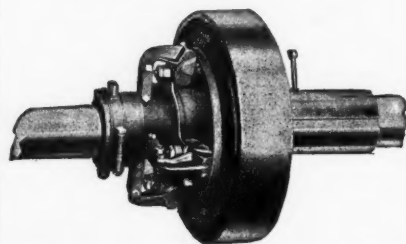
They Stand the Test.

MANUFACTURED BY

The Ohio Pulley Company,
Marion, Ohio.

AGENCIES IN ALL THE PRINCIPAL CITIES.

The
**UNIVERSAL
GIANT**



Friction Clutch

A Clutch that meets modern conditions. Simple in design, compactly and strongly built. A great advantage of this Clutch is that it can be used with any ordinary pulley, saving the loss of time and expense of making special pulleys.

For sale by dealers everywhere, or direct by us if your dealer cannot furnish.

T. B. Wood's Sons,
Chambersburg, Pa.

Mfrs. of Shafting, Pulleys, Hangers, Couplings, etc.

Users of high speed Pulleys will appreciate



Patented in the U. S. and Foreign Countries.

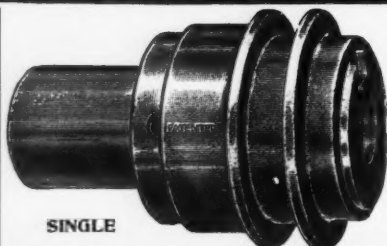
The American wrought steel Pulley

It embodies the Best ideas in practical transmission of Power.

SOLD BY
SUPPLY HOUSES EVERYWHERE

The American Pulley Co.
29th and Bristol Streets,
Philadelphia, Pa., U. S. A.

THE JOHNSON FRICTION CLUTCH

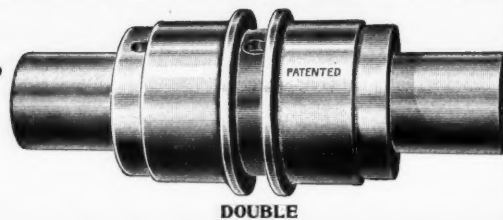


SINGLE

FOR
Machines, Countershafts,
Line Shafts, Etc.

Working parts entirely covered.
One screw adjusts to any tension.

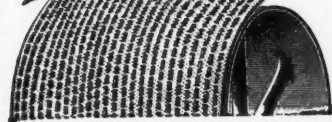
Write for Catalog C.



DOUBLE

THE CARLYLE JOHNSON MACHINE CO. HARTFORD, CONN.

LEVIATHAN



FOR TWO CENTS

postage, a sheet of paper, envelope and five minutes of your time, you can secure in a little "boiled-down" memoir, a positive flood of light on the subject of the "very best ever" belting, viz.:

"Leviathan Belting."

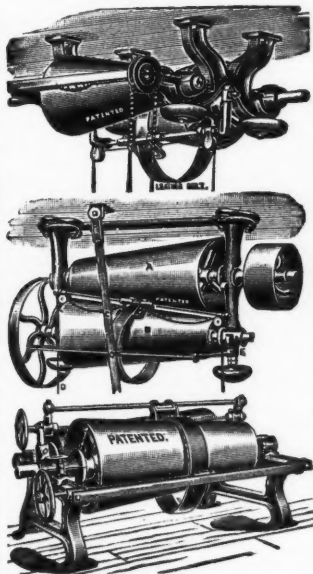
After you have heard its story, we think you will be strongly drawn to discover by an actual test, in what ratio "fact stands to fancy" in the strenuous statements of that same memoir. Shall we mail it?

Main Belting Company

Sole Manufacturers
12th AND CARPENTER STS., PHILA.
55-57 Market St., CHICAGO
120 Pearl St., 40 Pearl St.,
BOSTON BUFFALO
309 Broadway, NEW YORK

POOLE ENGINEERING & MACHINE CO.
ENGINEERS, FOUNDERS AND MACHINISTS.
BALTIMORE, MD.
MANUFACTURERS AND DESIGNERS OF ALL KINDS OF
HEAVY MACHINERY,
REQUIRING FIRST CLASS WORKMANSHIP AND MATERIALS.
BAND, ROPE AND FLY WHEELS. FRICTION CLUTCHES, SHAFTING, PULLEYS AND HANGERS.
MACHINE MOLDED AND PLANED GEARING.
MACHINERY FOR WHITE LEAD AND FERTILIZER WORKS.
GRAIN ELEVATORS, FLOUR MILLS, BRASS, COPPER
TIN PLATE ROLLING MILLS, CABLE MARINE RAILWAYS
POOLE-LEFFEL TURBINE WATER WHEELS
DREDGING MACHINES
IRON CASTINGS 30,000 LBS. TENSILE STRENGTH
CIRCULARS ON APPLICATION

Evans Friction Cone Pulleys



1 to 40 H. P. for changing speed of machinery while running. Send for Catalogue.

G. F. EVANS, - NEWTON CENTER, MASS.

Why do you run your belts tight and drag along a great dead drag of friction load? Every tight belt adds about 50 lbs. to it for each inch of its width.
The best plants run their belts slack or easy with Cling Surface, relieve their engines and whole system of this expensive drag. Have no belt troubles, no hot bearings, save oil and coal and money, preserve their belts and have more power every minute. Cling-Surface will do it for you just the same. Why shouldn't it. Then be pleased to write us. We want you to.

CLING-SURFACE CO
153-159 Virginia St Buffalo N Y
New York Boston Philadelphia Chicago
St Louis St Paul London New Orleans
Sydney Toronto

Belt in Marion Stove Co., Marion, Ind. Gandy (painted canvas) belt. 12 in. wide, 11 ft. centers. Main pulley 72 in. diam., 200 R. P. M. Driven Pulley 42 in. diam. Belt 17 in. slack. Cling-Surface used two years,

JEFFREY

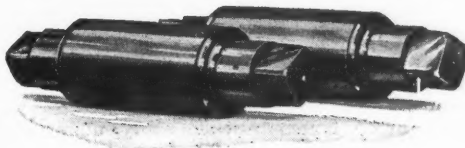
ELEVATING,
CONVEYING,
POWER
TRANSMISSION

MACHINERY

FOR CATALOGUE,
ADDRESS
THE JEFFREY MFG. CO.
COLUMBUS, O.

Lobdell Car Wheel Co.

Wilmington, Del., U. S. A.



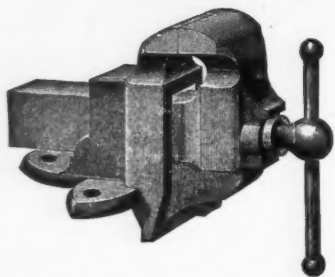
Manufacturers of
**Chilled Rolls for
Metals**

Fibre Calendering Machinery

Chilled Plungers for Pumps

Roll Grinding Machines

All Kinds of Chilled and Soft Iron Castings

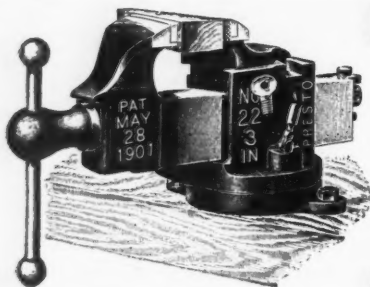


Send for catalogue 17 B, which also shows our full line of fine mechanical tools.

We Claim to Make the Best Line of Vises on the Market.

The Vise shown in cut is our "standard" pattern, made of first-class material so distributed as to produce the greatest strength and durability, the front jaw being reinforced from beneath. It is extra fitted, has jaws of best tempered steel, is convenient in use, and one of its greatest recommendations is the entire absence of complicated mechanism. Unquestionably the best solid nut screw vise made for machinists' use.

ATHOL MACHINE COMPANY, Athol, Massachusetts, U. S. A.



Emmert Universal Vises

Universally { Practical
Economical
Convenient

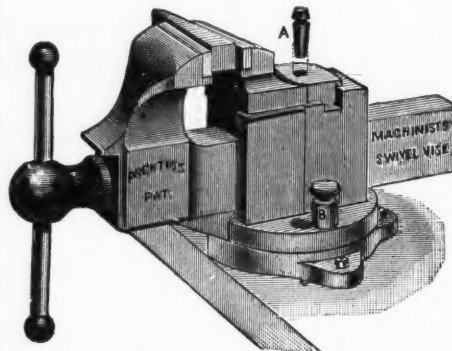
Quickly and easily operated and adaptable to any required position.

Universal Pattern Makers Vises
Universal Tool Makers Vises

Guaranteed.

Send for new catalogue.

Emmert Mfg. Co., Waynesboro, Pa.



Machinists' Swivel Vise

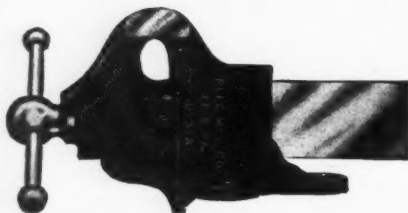
with self-adjusting jaw that is as strong and durable as any solid jaw, and a Swivel Bottom that gives any desired adjustment to right or left, and is solid and firm at any angle. We make all sorts of good vises, and have been leaders in this line for twenty years. Send for catalogue and price list.

Prentiss Vise Company,

44 Barclay Street, New York.

Agents for Great Britain, Chas. Neat & Co., Ltd.
Queen Victoria St., London, E. C.

Everybody Wants the Best

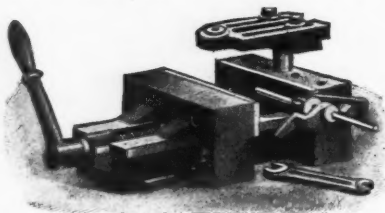


Especially when the cost is no greater. Unless you have a REED VISE you are falling short of the "best" standard—how about it?

Catalogue H on request.

REED MFG. COMPANY, Erie, Pa.

The Manifold Uses of the Universal Jig Vise



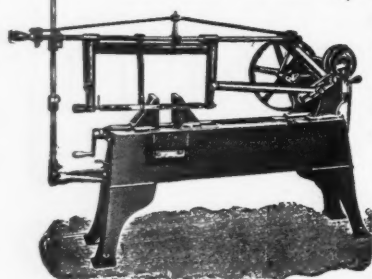
Particularly adapted for plain and duplicate drilling; a first-class vise for the planer, shaper or miller as well as the drill-press, and a machine that does a wide range of duplicate drill work without the cost of a jig.

Take one on trial, or at least send for circulars.

**The Graham Mfg. Co.,
Providence, R. I.**

Canadian Makers: Imperial Vise Co., Galt, Ont. Europe: Chas. Churchill & Co. Fenwick Freres & Co., Arthur Kayser, Berlin.

Draw Cut Machine Saw No. 2



Capacity 10 in. x 10 in.

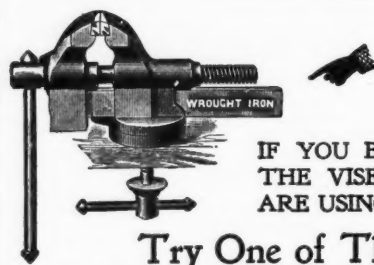
Cuts all kinds of cold metal, round, square or irregular shaped, smoothly, accurately and in less time than any other saw of its kind.

The improved features of this tool are:
Draw Cut, Geared Drive, Combination Feed, Adjustable Stroke.

Size No. 1 cuts 6" x 6". Circulars for details.

H. T. STORY

30 W. Randolph St., Chicago, Ill.

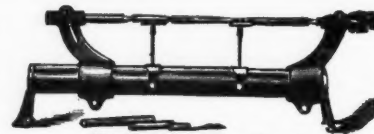


IF YOU BREAK
THE VISE YOU
ARE USING

Try One of These.

MERRILL BROS.

469 Kent Avenue, Brooklyn, N. Y.



(Style of 12 and 24 sizes.)

Measuring Machines.

Measuring screw, 10, 16 or 20 threads to the inch, graduated to read thousandths or 32ds without calculation.

The only Micrometer that will not lose its accuracy by wear.
SYRACUSE TWIST DRILL CO., SYRACUSE, N. Y.
Chas. Churchill & Co., Ltd., London, Eng., Agents for Great Britain.

Oneida "National" Lathe Chucks.



Recent improvements in these chucks have given them added strength and durability and fitted them for a wider range of work.

"National" Drill Chucks

have the most powerful grip of any drill chuck on the market. Absolute positive drive. Strong, durable, made of steel.

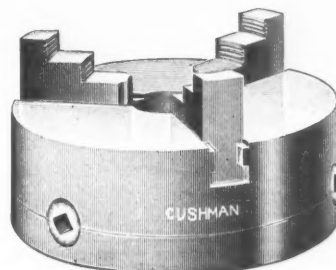
Write for catalogue of full line of chucks.

ONEIDA NATIONAL CHUCK CO., Oneida, N.Y., U.S.A.

English Representative: Alfred A. Jones, Church Gate, Leicester, England.



"CUSHMAN" CHUCKS



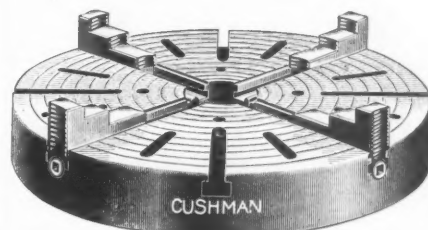
Lathe Chucks and
Drill Chucks
Two Jaw, Three Jaw
and Four Jaw
Universal and
Independent
Round Body and
Box Body

ALL SIZES

Also Face Plate Jaws

CATALOGUE FREE.

**The Cushman Chuck Co.
Hartford, Conn.**



Nobody looks for Better Taps than Card's because Card's leave nothing to be desired.

Same way with all Card's Screw Cutting Tools.

*Have you
a copy of
latest cata-
logue?*



S. W. CARD MFG. CO., Mansfield, Mass.

The "Rich" Improved Expanding Mandrel



is particularly simple in construction and is the only Mandrel having a uniform expansion throughout the entire length of the

spring bushing—a feature which makes it of special value in chucking light work, which would otherwise be scored or distorted. It is strong, durable always ready and made of best hardened steel. Set comprises 16 mandrels and 28 bushings, for holes from 1 to 7 inches.

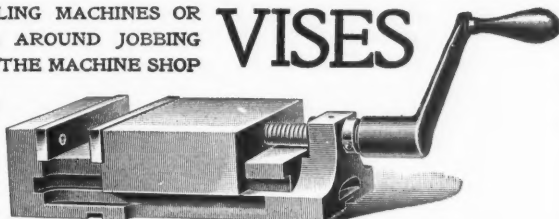
Geo. R. Rich Manufacturing Company, Buchanan, Mich.

CRANE FITTINGS

ESTABLISHED 1855

VICES FOR MILLING MACHINES OR FOR ALL AROUND JOBBING WORK IN THE MACHINE SHOP

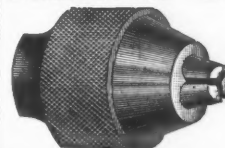
We have three sizes of these Vises in stock and can make prompt shipment. They are first-class in every particular. Send for circulars.



THE CARTER & HAKES MACHINE CO., WINSTED, CONN., U. S. A.

Or Manning, Maxwell & Moore, 85 Liberty Street, New York.

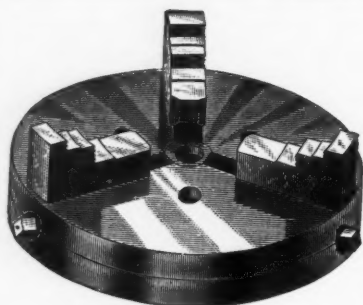
Almond Drill Chuck



Sold at
all Machinists'
supply stores

T. R. ALMOND MFG. CO. 83-85 Washington St., Brooklyn, N. Y.





74-Page Catalogue.

Why waste your **MONEY** buying low price chucks?

The Horton Lathe Chuck

is the cheapest in the end.

IT IS CELEBRATED THE WORLD OVER.

THE E. HORTON & SON CO., Windsor Locks, Conn., U. S. A.

Schuchardt & Schutte, Berlin, Vienna, St. Petersburg, Stockholm and New York. Fenwick Freres & Co., Paris, France. Van Rietschoten & Houwens, Rotterdam. Chas. Churchill & Co., London.



Hold Them!!!
— I will —
Who Will?

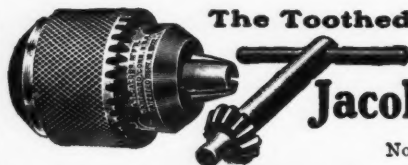
The PRATT CHUCK

Will—
Hold What?
Those High Speed Drills
No other chuck will.

SEND FOR BOOKLET.

The Pratt Chuck Co.
Frankfort, N. Y.

Sole English Agency, Sellg, Sonenthal & Co., London,
who keep a large stock.

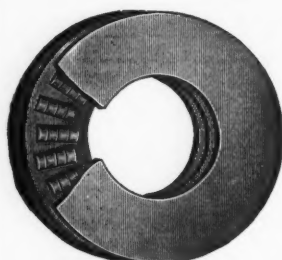


The Toothed Sleeve and Key is the feature
OF THE

Jacobs Improved Drill Chuck

No twisting of spindle when tightening drill.

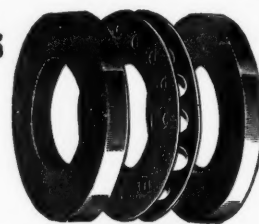
THE JACOBS MANUFACTURING CO., 70 PEARL STREET, HARTFORD, CONN.



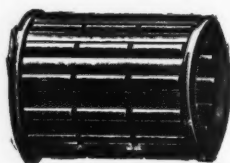
Plain Roller Thrust

Antifriction Bearings
of
all Descriptions.

Send for new
Catalogue.



Ball Thrust

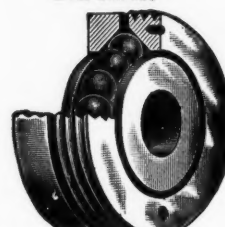


Journal Roller Bearing

The Ball Bearing Co.

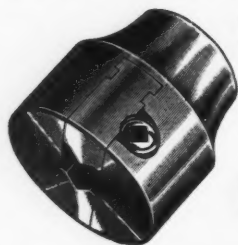
(FORMERLY OF BOSTON.)

Philadelphia, Pa., U. S. A.



Grooved Ball Bearing

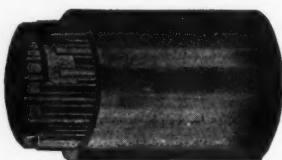
No Weak Places



In the Reid
Drill
Chuck.

One part is as strong as another. Out-
wears any other kind of chuck. Made
right and sold at the right price. Circulars
and price lists mailed on request.

R. H. BROWN & CO.
New Haven, Conn.



Journal Roller Bearing.

Standard Roller Bearing Company.

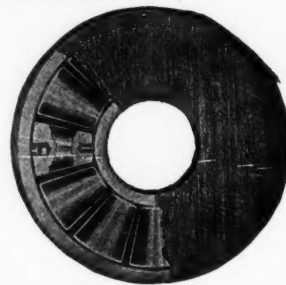
PHILADELPHIA, PA.

SEND FOR CATALOG.

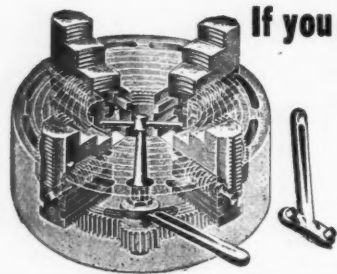


Plain Roller Thrust.

BALL BEARINGS
BALL THRUST
BEARINGS
ROLLER THRUST
BEARINGS
TAPERED
ROLLER THRUST
BEARINGS
SAVE POWER
AND OIL



Tapered Roller Thrust.



Spur Geared Scroll Combination Lathe Chuck.

If you want the best Lathe and Drill Chucks—buy Westcott's

Little Giant Auxiliary Screw Drill Chucks, Little Giant Double Grip Drill Chucks, Little Giant Improved Drill Chucks, Oneida Drill Chucks, Spur Geared Scroll Combination Lathe Chucks, Scroll Combination Lathe Chucks, Geared Combination Lathe Chucks, Geared Universal Lathe Chucks, Spur Geared Scroll Universal Lathe Chucks, IXL Independent Lathe Chucks, Cutting-off Chucks.

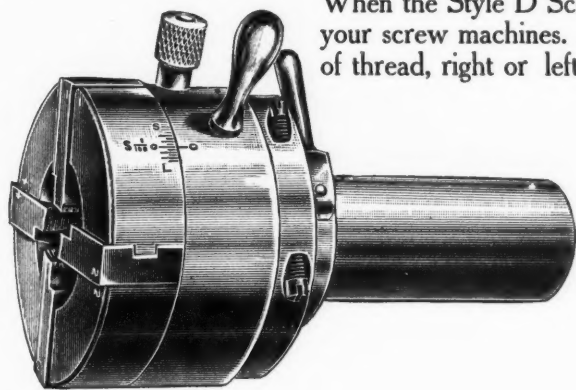
Strongest Grip, Greatest Capacity,
Great Durability, Accurate.

WESTCOTT CHUCK CO., Oneida, N. Y., U. S. A.

Ask for catalogue in English, French, Spanish or German.

Little Giant
Auxiliary Screw
Drill Chuck.

You'll soon notice the Difference in Output and Profit



When the Style D Screw Cutting Die Head takes the place of solid dies in your screw machines. These Die Heads are adapted to cut any size or style of thread, right or left hand, and the length of thread is limited only by the travel of the turret slide. They are very rapid, insuring the maximum output, open automatically at the end of cut, thus averting danger of spoiled work and saving the time usually wasted in running back over finished threads. They are well made, durable and can be furnished in a great variety of sizes. We shall be glad to answer any questions or submit an estimate of suitable outfit of tools on receipt of sample, or drawings showing work you are doing.

The Geometric Tool Company, (Westville Station) New Haven Conn., U. S. A.

Foreign Agents—Chas. Churchill & Co., Ltd., London, Birmingham, Manchester, Glasgow, Newcastle-on-Tyne. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan, Bilbao. Schuchardt & Schutte, Vienna, St. Petersburg, Stockholm. Berlin.

Don't Stop the Machine

to change the drill, reamer, tap or counterbore—that's a waste of time and a needless labor.

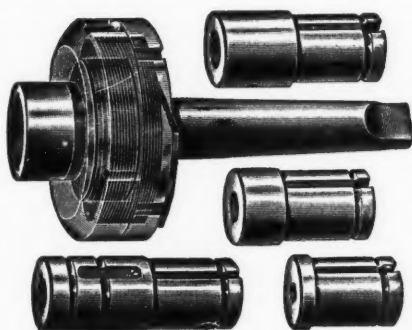
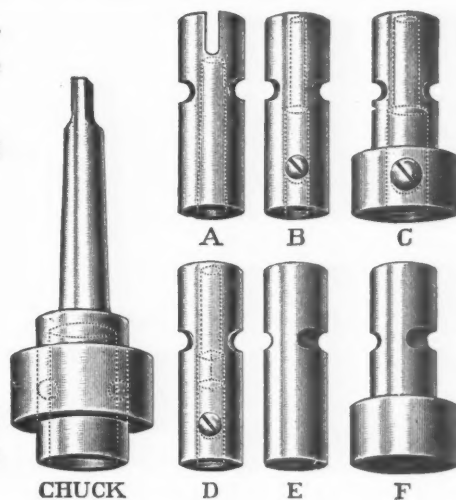
The "MAGIC" Chucks and Collets

permit the substitution of one tool for another instantly, simply and without lessening the speed of machine. Designed for use on the spindle of upright drills, but applicable to lathes or other horizontal spindle tools.

A word from you and we will fully explain the "Magic."

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Modern Tool Company
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THE Safety Drill & Tap Holder

is the only attachment for the purpose that gives universal satisfaction, and is

UNEQUALLED in Efficiency, Convenience, Rapidity, Accuracy and Simplicity.

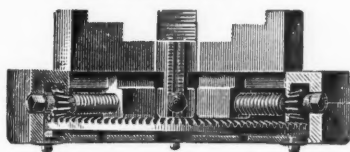
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All Styles
All Sizes

Independent Chucks



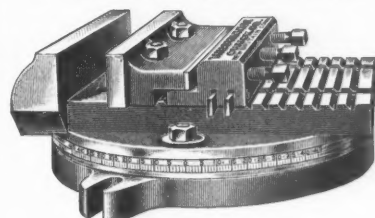
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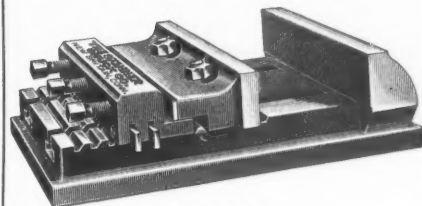
The Hoggson & Pettis Mfg. Co., New Haven, Conn. U.S.A.

European Agent, D. Well, 22 Rue Richer, Paris.

Skinner Planer Chucks with 1905 improvements



Round Swivel Base.

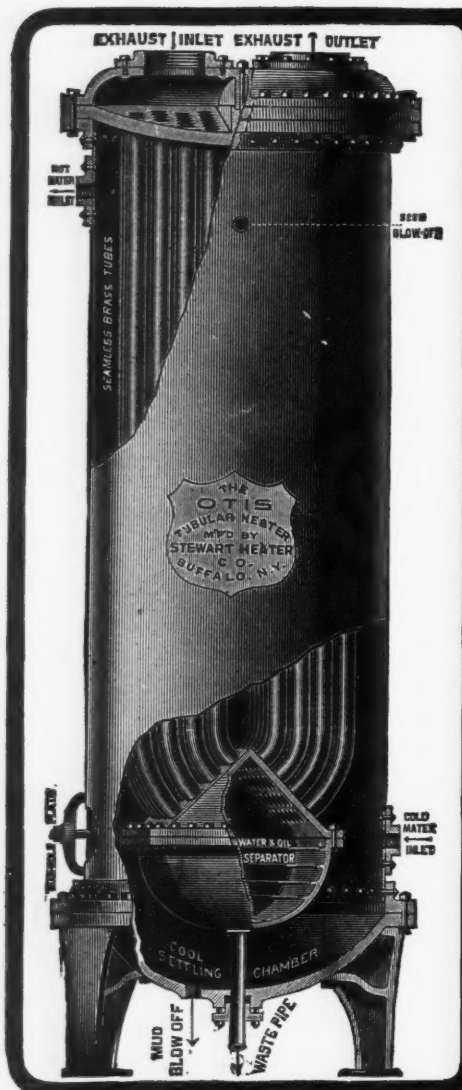


Square Base.

Made in 16 sizes. Let us send you printed matter and quote prices.

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Factory: New Britain, Conn., U. S. A.
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Tubular Feed Water Heater, Oil Separator and Purifier.

is not an experiment but a tried and tested appliance that the makers are not afraid to

G U A R A N T E E

To heat the feed water to the *boiling point* (210 or 212 degrees) with the exhaust steam without causing any back pressure, *also* to extract the oil from the exhaust, so that the exhaust steam after being passed through the heater can be used for heating purposes, and the water of condensation for the heating system be returned to the boiler without the *additional expense* of an *eliminator*.

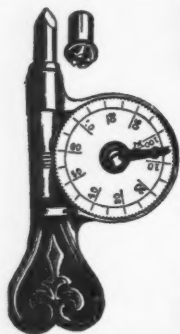
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Catalogue and Prices at Your Service.

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WOODMAN & HUDSON'S Speed Indicator.

An ingenious little instrument for ascertaining the correct speed of Dynamos, Steam Engines, Shafting, Floor Machines, etc. No first class mechanic, superintendent or factory should be without one. They are adapted to hollow or pointed centers, and are absolutely correct. Every indicator is handsomely nickel-plated and of convenient size to carry in the pocket.

Price: Split Cap, adapted to either pointed or hollow centers, \$1.00.
Plain Cap, for hollow centers only, 75c.

We also keep a Double Registering Speed Indicator. Prices on application.

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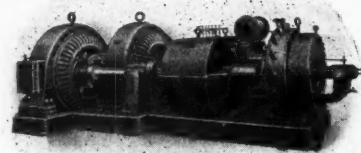


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Meets every demand for convenience and effectiveness and cannot injure leather.

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Florida Electric Co., Jacksonville, Florida.
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Geo. P. Dravo, Milwaukee, Wis.
Chester B. Davis, Dallas, Texas.
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NONE BETTER.
MANUFACTURED BY
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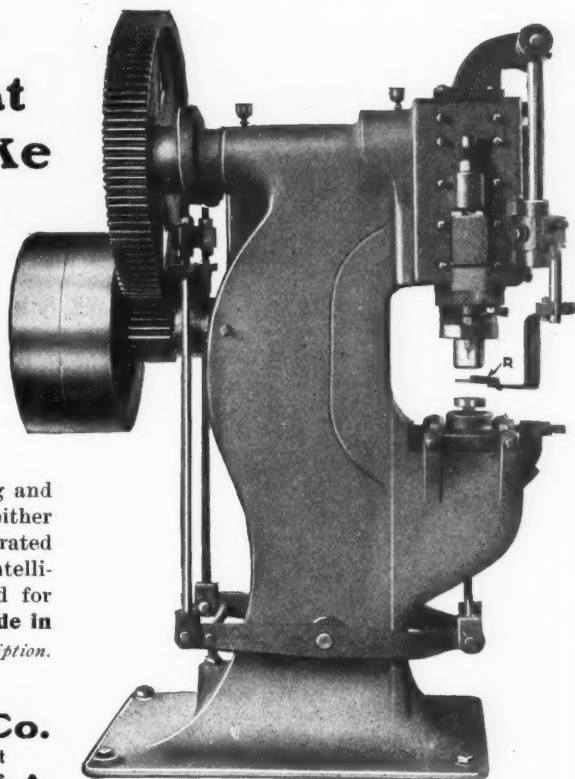
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This new Punching Machine is adapted for cutting and punching of almost every kind, but is especially valuable for making washers from scrap plate metals or fibre, and for cutting armature discs, hardware and electrical specialties from hard or soft metal.

It is very rapid, cutting and punching at one stroke, either single or multiple; can be operated by any person of ordinary intelligence, and can be arranged for shearing when desired. **Made in four sizes.** Write for full description.

Krips-Mason Machine Co.

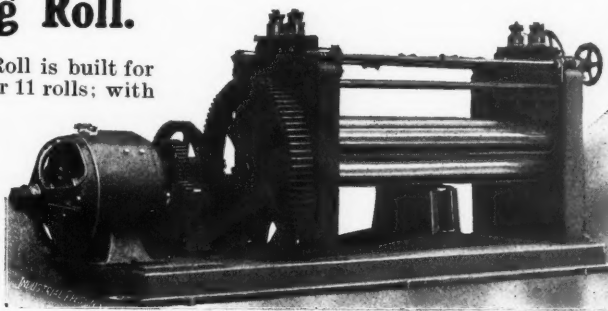
1636 North Hutchinson Street
Philadelphia, Pa., U. S. A.



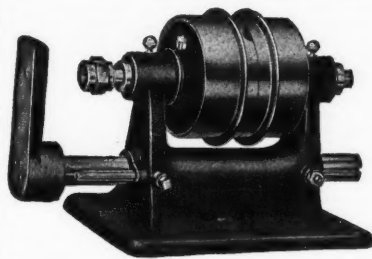
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This Straightening Roll is built for any capacity with 7, 9 or 11 rolls; with Motor, Engine or Belt Drive. The top rolls have independent and universal adjustment.

We build a complete line of
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all sizes up to 75 tons
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No. 1 1/2 Tapping Machine

For the Finest Classes of Tapping Work.

This machine has friction drive, is noiseless, runs with exceptional smoothness, has no gears, pins or clutches to wear out, and will be found a great saver of time and taps. Easily operated, reversed instantly, rapid and accurate.

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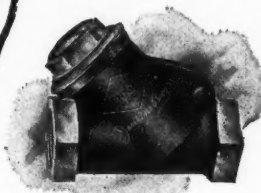
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These valves offer practically no obstruction to the free flow of fluids. They are fitted with the Jenkins Disc, and as the disc takes all the wear the seat is seldom injured. The valve is self-adjusting, and can be used either in horizontal or vertical position. Owing to the ease with which repairs can be made and as the passage is practically unobstructed, these valves are largely used for boiler feed lines and similar work.

Send for booklet, "VALVE TROUBLES AND HOW TO AVOID THEM."

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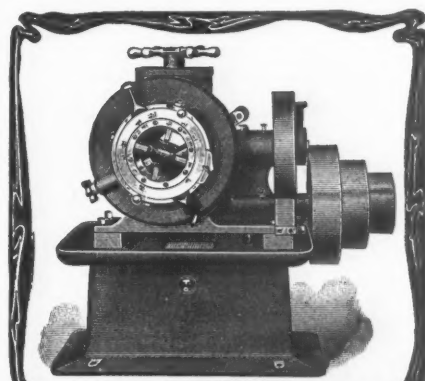


SHEARING PUNCHES FOR HEAVY WORK.

They go through the Metal easy.



Punches and Dies for all sizes of Rivets.
First class work and satisfaction given.



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COMBINED HAND AND POWER
PIPE THREADING MACHINES
ARE JUST AS GOOD, IN EVERY
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AND THEY LEAD THE PRO-
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of all kinds can be done better and quicker with a

P. S. PUNCH

than with any other punch on the market.

Strongest, most durable, best for severe service.

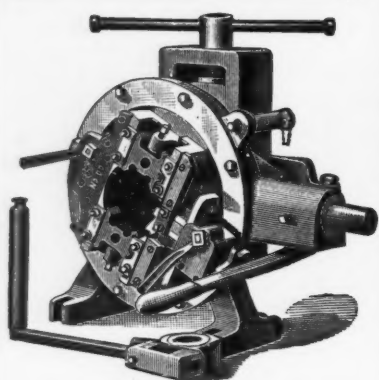
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A trial order will convince you.

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No. 00 Machine.

Armstrong's Pipe Threading and Cutting-off Machines For Hand or Power

Save time and labor, strong and simple in construction. All the driving gears are enclosed in oil chambers, thus keeping them well lubricated and free from chips or dirt.

Capacity of different Machines.

No.	Machine	1/4 to 2 inches.
" 00.	"	1 " 4 "
" 1.	"	1 " 3 "
" 1 1/2.	"	1 " 4 "
" 3.	"	1 " 6 "

Catalogue sent on request.

The
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Bridgeport, Conn.

New York Office, 139 Centre Street.



Metal Polish

Highest Award
Chicago World's Fair, 1893,
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3-oz. Box for 10 cents.
Sold by Agents and Dealers
all over the world. Ask or
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5-lb. Pails, \$1.00.
GEO. W. HOFFMAN,
Expert Polish Maker,
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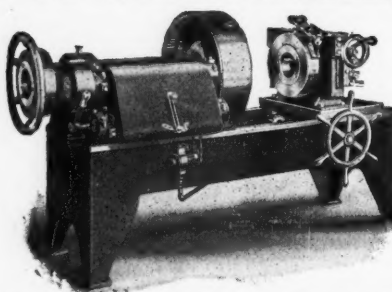
UPTON & GILMAN

Designers and Manufacturers
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Particularly well equipped for Die Work. General
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You will eventually Buy one of our Pipe Threading Machines



even though you may get one or two others first, because we have more improvements in our machines and they will do more work. Isn't that what you are looking for?

THE STOEVEY FOUNDRY & MFG. CO., Myerstown, Pa.



Columbus Pipe Threading Machines.

Hand or Power. Single or Double Vise.

Columbus Gas Engines.

Columbus Machine Co.,
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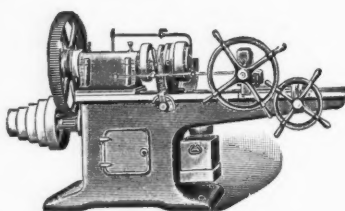
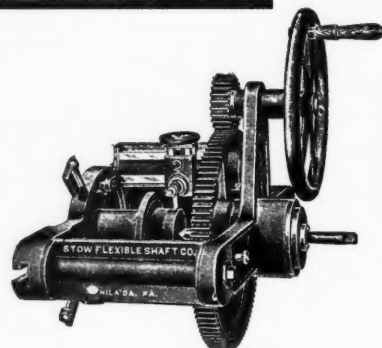
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Forcing out pins and turning them on a lathe, use

Schoff's Portable Crank Pin Turning Machine

You'll save money
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Bolt Cutters and Nut Tappers.

ALL SIZES.

Single and Multiple Spindle,
either belt or motor driven.

The Reliance Machine and Tool Company,
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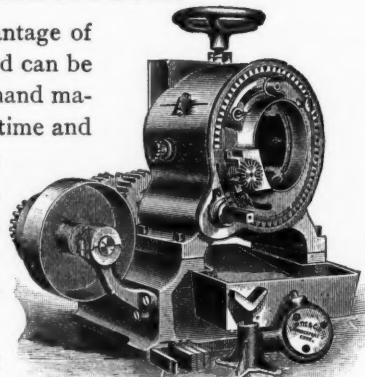
The Forbes Patent Die Stock

As Arranged for Hand or Power.

This machine has the double advantage of being a power machine, or when needed can be removed from the base and used as a hand machine on outside work. It has all the time and labor saving features for which the "Curtis" is noted, is complete in itself, especially valuable for work in cramped quarters, has a range from 2 1/2" to 4", and a patent adjustment of shell by which wear is taken up.

Catalogue shows our full line of Pipe Cutting and Threading Machinery. Send for a copy.

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Have you seen any Pipe Threading Machine

approaching the Standard Wieland in beauty of design?

It's capacity for economical work is just as attractive.

Single speed pulley; *all-gear speed changes.*

What size of machine shall we send you information about?

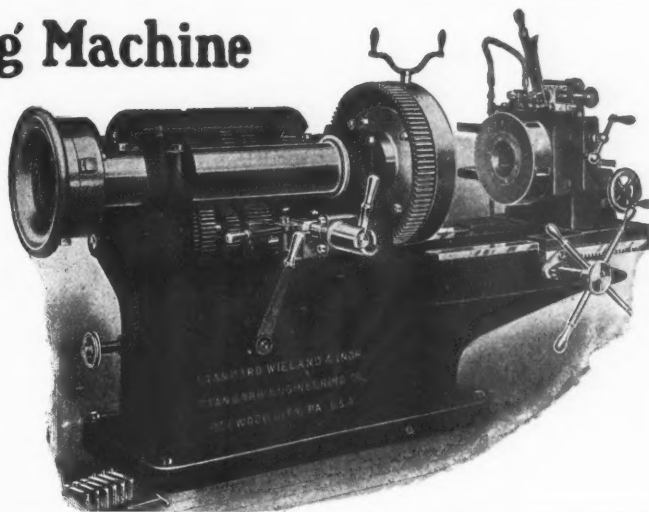
Standard Morgan Bolt Threaders.

Standard Engineering Co.

Ellwood City, Penna.

New York Office: 123 Liberty Street.

St. Louis Office: 1012 Chemical Building.

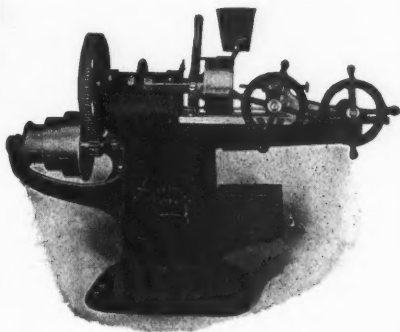


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The Great Characteristics of the

Merriman Bolt Threaders:

1. Simplicity of the Head, only four pieces.
2. Durability of parts.
3. Square bearing of Dies in Ring; consequently,
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6. Effectiveness of operation; any boy can understand it.



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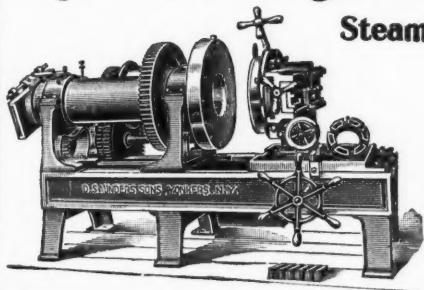
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CRANE VALVES

ESTABLISHED 1855

Pipe Threading and Cutting Machines.

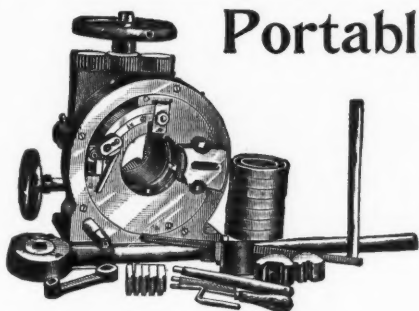
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All our machines are of improved design and unsurpassed for efficiency of operation and quality of workmanship.

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Portable Hand Machine For Cutting and Threading Pipe

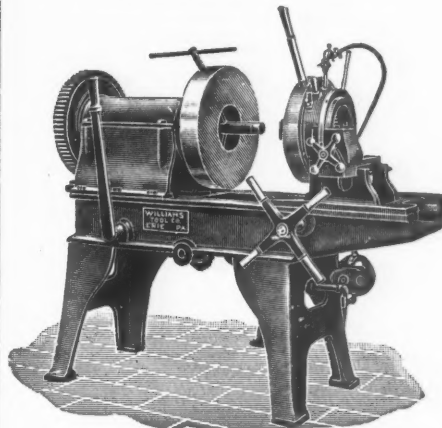
This tool is provided with standard adjustable quick opening and closing die head, and improved cutting-off knife. Wide range of work and quick changes from size to size of pipe.

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European Office, Fairbanks Co., 78-80 City Road, London, E. C.

Williams Pipe Machines ARE ALL RIGHT

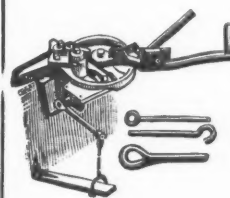


New designs, with all up-to-date features. Strong and durable in construction, rapid in operation, adapted for the most accurate work.

Quick opening adjustable dies.
Sizes from $\frac{1}{4}$ in. to 12 in.

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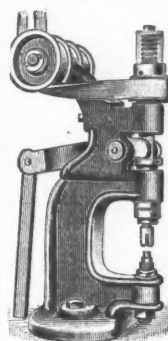
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We make hand power benders for forming eyes from stock 1 3/8 inch thick and under. Any size eye 7 inches outside diameter and under.

Wallace Supply Co.
905 Garden City Block,
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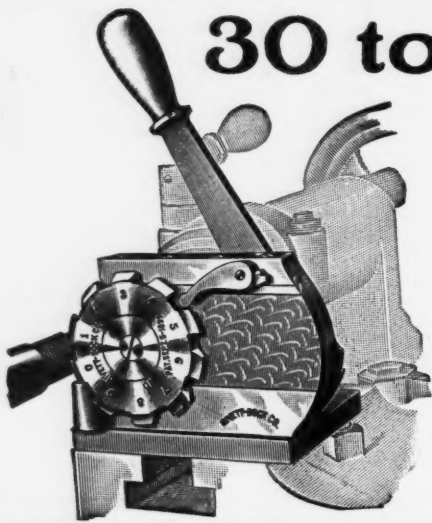
Spins head on shank of rivets $\frac{1}{4}$ " dia. and under.

GREAT

for typewriter, adding machine and other parts.

Send for Circular.

The Grant Mfg. Co.
BRIDGEPORT, CONN.



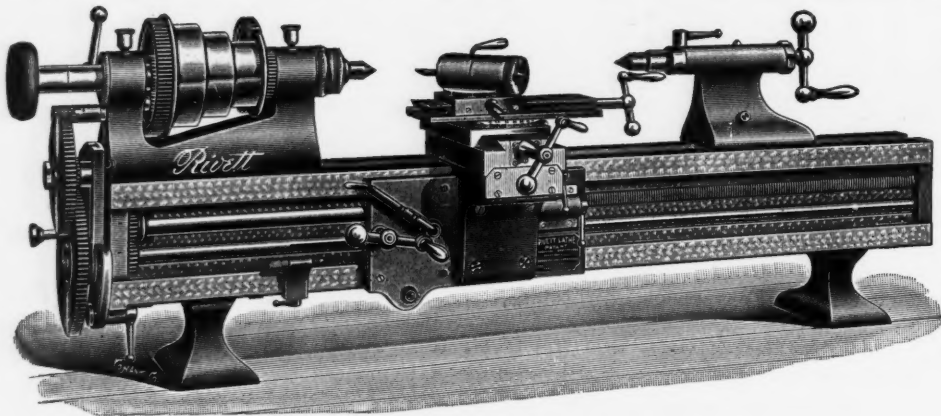
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on one class of work amounts to a very tidy little sum at the end of the year. The Rivett-Dock Thread-cutting Tool effects this saving over the old way of cutting threads with a single point tool and does better work. The Rivett-Dock Tool is simple in construction, can be operated by any workman, insures absolutely accurate threads, requires infrequent grinding and is practically indispensable for duplicate work.

Let us send you one for thirty days. A trial will convince you.

The Rivett-Dock Company, Brighton, Boston, Mass.

The "Rivett" Precision Lathe



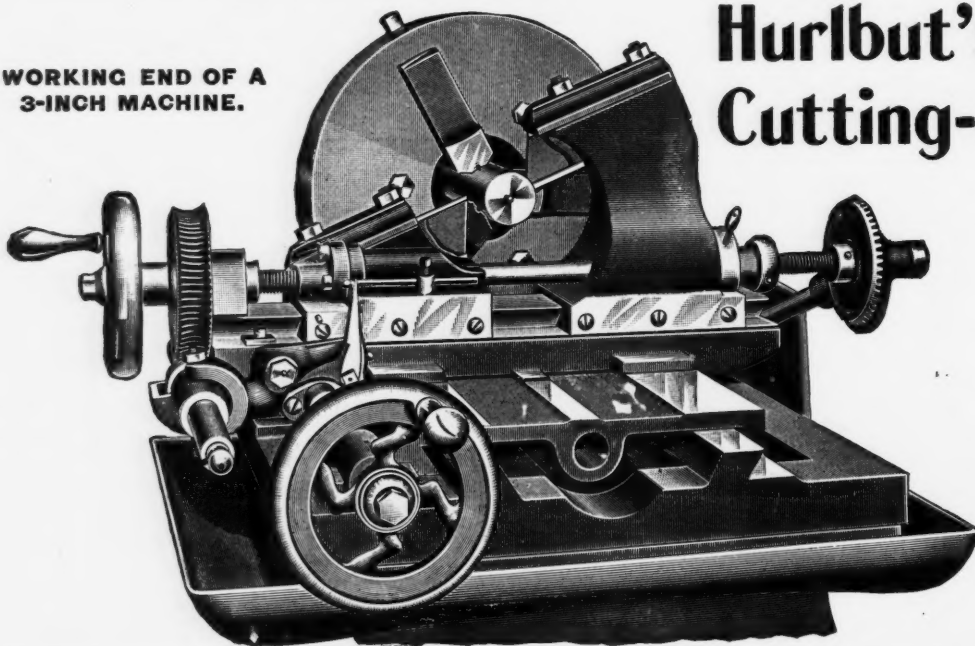
Rivett Back-Geared Precision Lathe

For those classes of work which require the extreme of accuracy, and especially valuable for tool makers, makers of fine instruments and for experimental work. This lathe, though adapted for the most delicate operations, has the strength and rigidity to stand much heavier work, and possesses advantages that put it ahead of all other precision lathes.

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WORKING END OF A
3-INCH MACHINE.



Hurlbut's Patent Cutting-off Machine

Made in 2-inch, 3-inch, 4-inch 5-inch, 6-inch, 8-inch and 10-inch sizes.

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MACHINE CO.**

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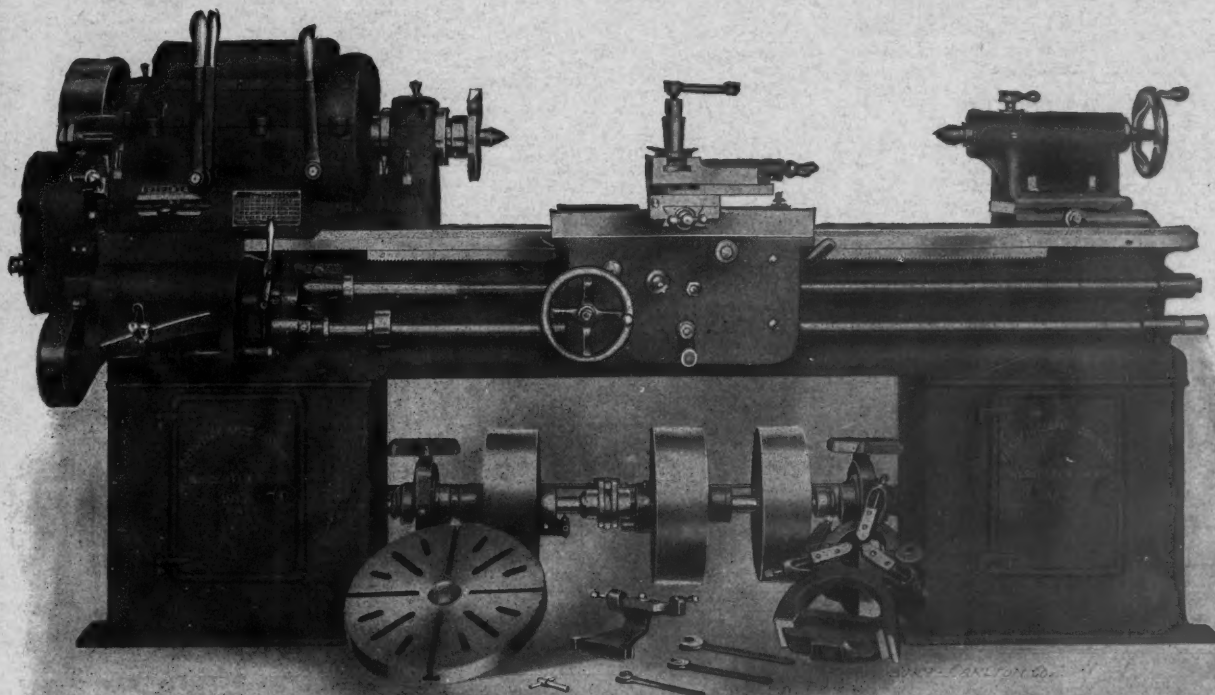
MCCULLOUGH-DALZELL CRUCIBLE COMPANY, PITTSBURGH, PA.



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Our New High Speed Engine Lathe

Is Built on Correct Principles



The *constant speed* of the belt delivers a maximum power, regardless of the speed of the spindle.

Eight Spindle Speeds may be obtained in the lathe head, thereby doing away with the cumbersome multi-speed and multi-belt countershafts.

All *speed changes* may be made instantly and without stopping the machine.

It is *impossible* for the operator to engage conflicting ratios of gearing.

With and without Quick Change Gear Device.

FULL PARTICULARS ON APPLICATION

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Worcester, Mass., U. S. A.

Call at the Philadelphia Bourse and see our Exhibit in charge of J. W. Cregar Agency

FOREIGN AGENTS: Schuchardt & Schutte, Berlin, Vienna, Stockholm, St. Petersburg. Alfred H. Schutte, Cologne, Brussels, Liege, Paris, Milan and Bilbao.

Gorton Disc Grinders

Our No. 6-W is useful in shops where two operations are required of one machine.

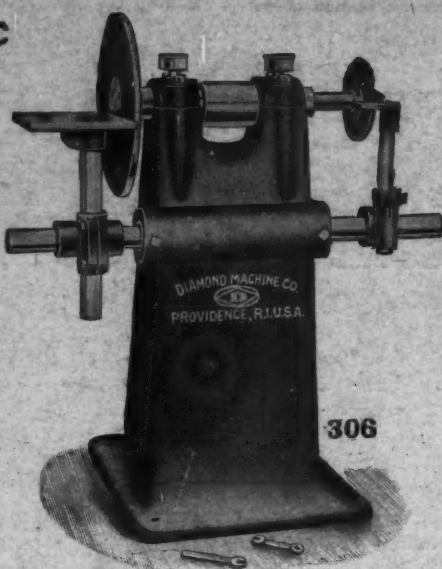
The left end is fitted with a steel disc and a 10" x 12" table which is square with the face of the disc and has 9" vertical adjustment. The work is rested upon the table and forced against the disc by hand.

The right end is provided with a 10" x 1" emery wheel and tool rest. This allows the machine to be used for grinding small tools.

A catalog of 94 pages describes our complete line of Gorton Grinders.

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Diamond Machine Co.
Providence, R. I.



Star Hack Saws

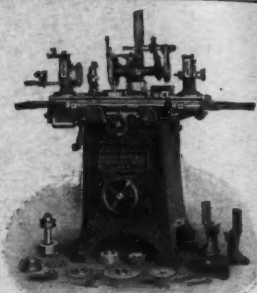


No other tool so popular

Mechanics swear by them
Economical manufacturers buy them
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Millers Falls Co.
28 Warren St., NEW YORK

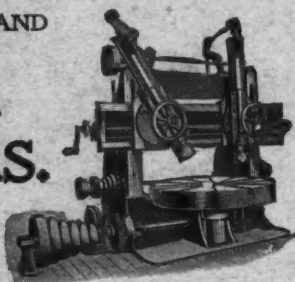
The Walker system of Fine Variations of wheel speeds reveals the secret of successful grinding.



Tool Room Grinders.
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Boring and Turning Mills.

4, 5, 6, 7 AND 8 FOOT SWING.



Send for photographs and prices.

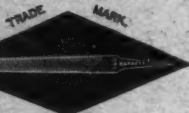
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INC. 1893.

TWELVE MEDALS
awarded at
INTERNATIONAL
EXPOSITIONS.



GRAND PRIZE
GOLD MEDAL
at Atlanta, Ga., 1895.

Catalogue sent free to any interested file user upon application.

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Grinding and Polishing Machinery



PATENT "PULL" COUNTERSHAFTS. TRADE MARK

BUILDERS IRON FOUNDRY, Providence, R. I.

DROP PRESSES

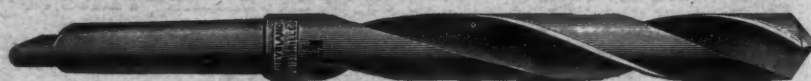
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